GW - 27

REPORTS

YEAR(S):

1985

OCT 21 1985

50 YEARS

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

1935 - 1985

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

October 18, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Warren Petroleum Co.
P.O. Box 1589
Tulsa, OK 74102

Attention: Ms. L. T. Reed

Re: Dicharge Plans for Monument (GW-25), Saunders (GW-26) and Vada (GW-27) Gas Processing Plants - Lea County, NM

Dear Ms. Reed:

The information that was stipulated for approval of the subject discharge plans has been reviewed and accepted by OCD. The above-listed discharge plans are hereby approved for a period of five years. This approval will expire July 31, 1990, and you should submit an application for new approval in ample time before that date.

Hydrostatic tests on the Saunders underground wastewater piping will be required for discharge plan renewal in 1990. Hydrostatic tests of underground wastewater piping at the Vada plant will not be required until 1995.

On behalf of the staff of the Oil Conservation Division, I wish to thank you for your cooperation during this discharge plan review.

Sincerely,

R. L. STAMETS
Director

RLS/JB/dp

cc: Oil Conservation Division - Hobbs

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

January 5, 1990

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-160

Ms. L. T. Reed
Senior Engineer
WARREN PETROLEUM COMPANY
P. O. Box 1589
Tulsa, Oklahoma 74102

RE: Discharge Plan GW-27
Vada Gas Processing Plant
Lea County, New Mexico

Dear Ms. Reed:

On July 31, 1985, the ground water discharge plan, GW-27 for the Vada Gas Processing Plant located in Section 23, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, was approved by the Director of the Oil Conservation Division (OCD). This discharge plan was required and submitted pursuant to Water Quality Control Commission (WQCC) regulations and was approved for a period of five years. The approval will expire on July 31, 1990.

If your facility continues to have effluent or leachate discharges and you wish to continue discharging, please submit your application for renewal of plan approval as quickly as possible. The OCD is reviewing discharge plan submittals and renewals carefully and the review time can often extend for several months. Please indicate whether you have made, or intend to make, any changes in your discharge system, and if so, include an application for plan amendment with your application for renewal. To assist you in preparation of your renewal application, I have enclosed a copy of the OCD's guidelines for preparation of ground water discharge plans at natural gas processing plants. These guidelines are presently being revised to include berming of tanks, curbing and paving of process areas susceptible to leaks or spills and the disposition of any solid wastes. Please include these items in your renewal application.

If you no longer have such discharges and discharge plan renewal is not needed, please notify this office.

Please note that all gas plants, refineries and compressor stations in excess of 25 years of age will be required to submit plans for, or the results of, an underground drainline testing program as a requirement for discharge plan renewal.

If you have any questions, please do not hesitate to contact Roger Anderson at (505) 827-5884.

Sincerely,

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

Enclosure

cc: OCD Hobbs Office

WARREN PETROLEUM COMPANY,
A DIVISION OF CHEVRON U.S.A. INC.

DISCHARGE PLAN GW-27
FOR
VADA GAS PROCESSING PLANT

1639/08100/LLJ/VADA DISG PLAN
/1

TABLE OF CONTENTS

SECTION I

GENERAL INFORMATION

DISCHARGE PLAN
VADA PLANT
SECTION I - GENERAL INFORMATION

INTRODUCTION

The following is presented as the Vada Plant Discharge Plan and is in accordance with Part 3 of the Water Quality Control Commission Regulations.

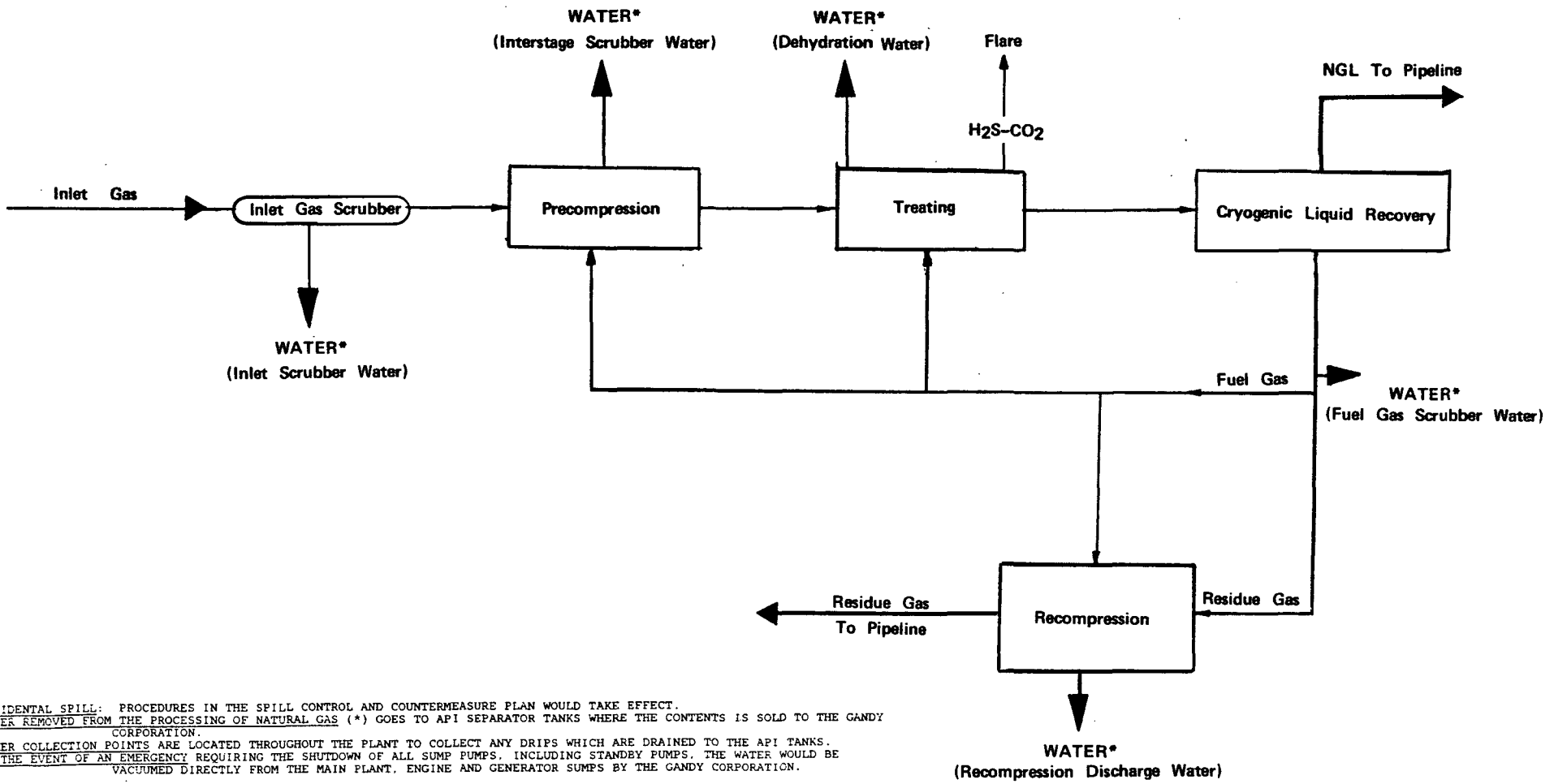
This Plan provides information regarding any potential discharges onto or below the surface of the ground.

SUMMARY OF WASTEWAER DISPOSAL METHODS
VADA GAS PROCESSING PLANT

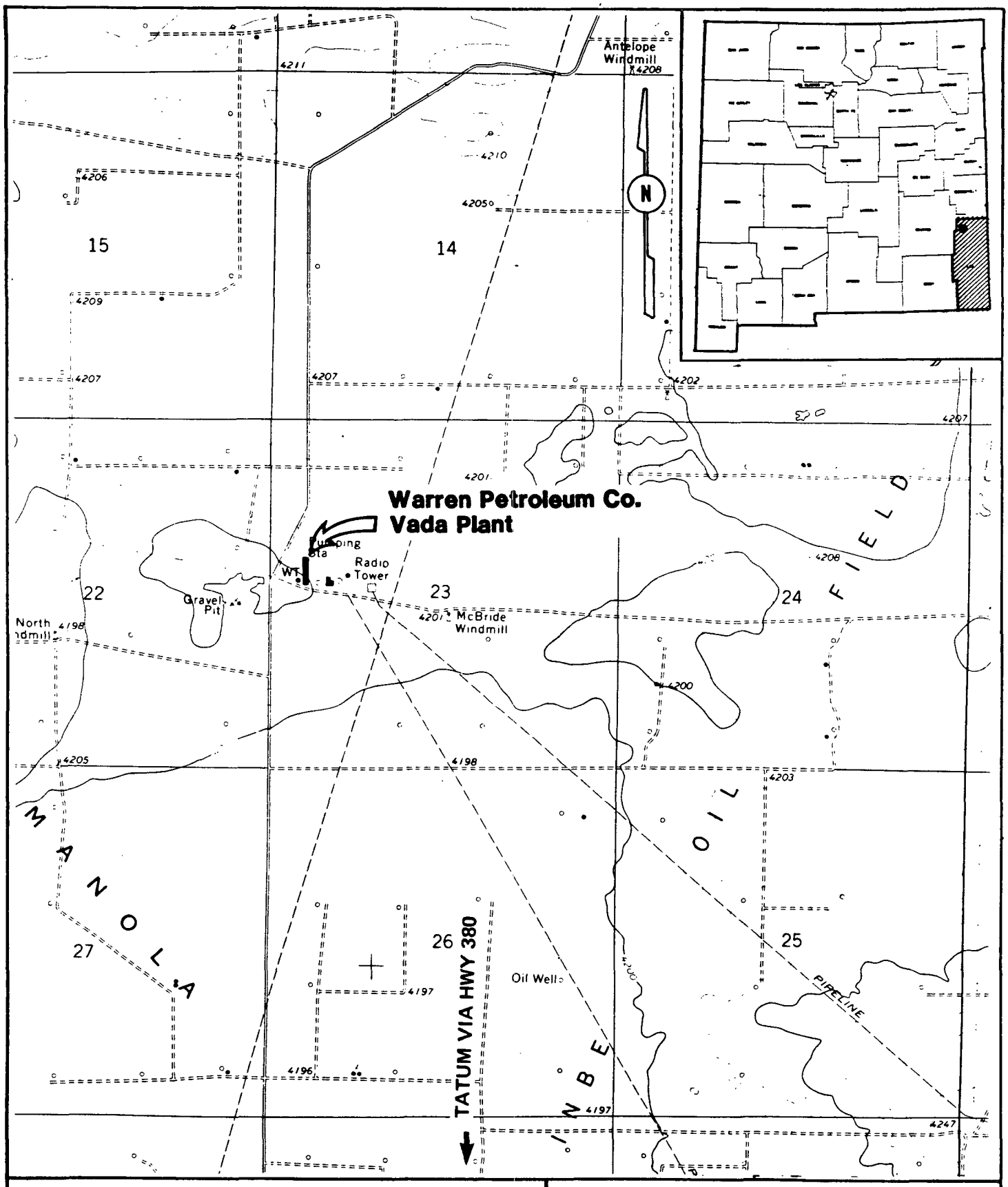
Location	Wastewater Disposal Methods*
23T10S, R33E Lea County, NM	Stored on Site Prior to Being Hauled for Reclamation or Injection by Contract with Gandy Corporation. Scrubber Oil and Used Oil Is also Sold to the Gandy Corporation. Any Sludge Accumulation Is Removed by Vacuum Truck for Disposal at Gandy's Approved Site.

*Section IX of this Plan further describes the disposal of waste materials generated at the Vada Plant.

SUMMARY OF WASTE WATER DISCHARGE--VADA PLANT



ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.
WATER REMOVED FROM THE PROCESSING OF NATURAL GAS (*) GOES TO API SEPARATOR TANKS WHERE THE CONTENTS IS SOLD TO THE GANDY CORPORATION.
OTHER COLLECTION POINTS ARE LOCATED THROUGHOUT THE PLANT TO COLLECT ANY DRIPS WHICH ARE DRAINED TO THE API TANKS.
IN THE EVENT OF AN EMERGENCY REQUIRING THE SHUTDOWN OF ALL SUMP PUMPS, INCLUDING STANDBY PUMPS, THE WATER WOULD BE VACUUMED DIRECTLY FROM THE MAIN PLANT, ENGINE AND GENERATOR SUMPS BY THE GANDY CORPORATION.



PLANT LOCATION
SEC. 23, T-10-S, R-33-E

APPROX. EL. 4225'
APPROX. LAT. 33°25'00" N
APPROX. LONG. 103°33'30" W

SCALE	DATE
1" = 2000'	7-27-82

Warren Petroleum Company

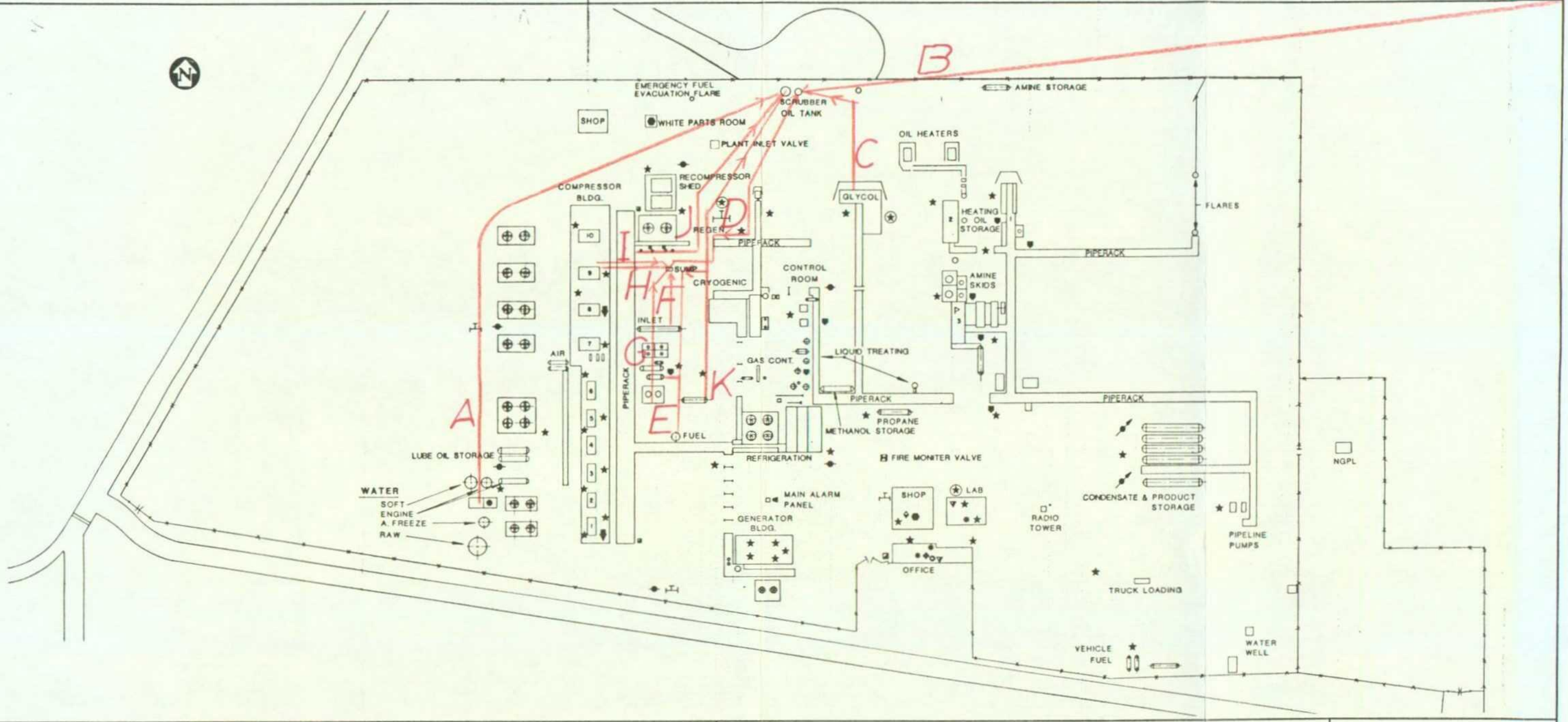
TULSA, OKLAHOMA

VADA
PLANT NO. 139
LEA CO., N.M.

VADA PLANT
UNDERGROUND WASTEWATER PIPING

ITEM	SOURCE	SIZE	MATERIAL	WALL IN. THICKNESS	CONNECTIONS	YEAR INSTALLED	AGE YEARS
A	Water Softener	2" SDR-11	Polyethylene	0.216	Fused	1984	6
B	Field Scrubber	1" SCH 80	Steel	0.179	Welded	1969	21
C	Glycol Skid	1" SCH 80	Steel	0.179	Welded	1969	21
D	Regen Filter	1" SCH 80	Steel	0.179	Welded	1981	9
E	Fuel Scrubber	1" SCH 80	Steel	0.179	Welded	1984	6
F	Inlet Scrubber	1" SCH 80	Steel	0.179	Welded	1969	21
G	Scrubber Drains	1" SCH 80	Steel	0.179	Welded	1975	15
H	Engine Room	4" SCH 40	Steel	0.237	Welded	1969	21
	Engine Room	12" SCH 30	Steel	0.330	Welded	1969	21
J	Recompressors	1" SCH 80	Steel	0.179	Welded	1981	9
K	3rd Stage	1" SCH 80	Steel	0.179	Welded	1969	21

VADA PLANT EMERGENCY & DISASTER PLAN



EMERGENCY TELEPHONE NUMBERS

VADA PLANT	398-5568	POLICE	396-4444
PLANT MANAGER J.R. Boyd	396-3221 (office)	STATE POLICE	392-5568
		SHERIFF	396-4444
PLANT SUPERVISOR W. I. Mayfield	396-3632 (home)	FIRE DEPARTMENT	396-5555
		AMBULANCE	396-5555
FIELD SUPERVISOR L. G. Caudill	396-4271 (home)	HOSPITAL	392-6581
PLANT ENGINEER M. M. Browne	396-2948 (home)	PUBLIC AFFAIRS - Santa Fe Santana Gonzalez	505-988-8905 (office) 505-984-2806 (home)
MANUFACTURING DEPARTMENT - Tulsa W.R. Hamn	918-560-4050 (office) 918-742-4936 (home)	PUBLIC AFFAIRS - Houston (Alternate if Mr. Gonzalez (Santa Fe) cannot be reached) Clay Hooper	713-754-9170 (office) 713-376-7497 (home)
M. L. Ingram	918-560-4060 (office) 918-494-0037 (home)	ENVIRONMENTAL AND TOXIC SUBSTANCES - Tulsa Lynn Reed	918-560-4119 (office) 918-663-3397 (home)
CHEVRON PIPELINE G. B. Lasson	396-7456	SAFETY - Tulsa J. C. Long	918-560-4190 (office) 918-492-7996 (home)

EMERGENCY EQUIPMENT LEGEND

- SHUTDOWN STATION
- FIRE CONTROL PANEL
- FIRE EXTINGUISHER
- FIRE EXTINGUISHER — WATER
- FIRE EXTINGUISHER — WHEEL UNIT
- FIRE PUMP
- FIRE HOSE CART
- HYDRANT
- FIRE MONITER
- FIRST AID KIT
- SHOWERS
- EMERGENCY OXYGEN
- GAS MASK
- FIRE BLANKET
- EMERGENCY WHISTLE
- WIND SOCK
- SELF-CONTAINED BREATHING APPARATUS
- H2S GAS DETECTOR

Chevron

Warren Petroleum Company

A Division of Chevron U.S.A. Inc.

PRODUCED BY J. T. Sansom

LEGEND

VESSELS

30-1	INLET SCRUBBER
30-3	1ST. STAGE DISCHARGE SCRUBBER
30-4	2ND. STAGE DISCHARGE SCRUBBER
30-5	3RD. STAGE DISCHARGE SCRUBBER
30-8	LIQUID TREATER PRE-MIXER
30-10	LIQUID TREATER SETTLER
30-11	GAS CONTACTOR SCRUBBER
30-12	GAS CONTACTOR
30-13	LIQUID TREATER FLASH CAN
30-14	3RD. STAGE FILTER
30-15	GAS CONTACTOR SCRUBBER #2
30-16	GAS TO DEHYS SCRUBBER
30-17	FUEL SCRUBBER
30-18	RECOMPRESSOR DISCHARGE SCRUBBER
30-19	RECOMPRESSOR INTERSTAGE SCRUBBER
30-20	RECOMPRESSOR SUCTION SCRUBBER
30-21	REGEN. GAS SCRUBBER
30-22	ENGINE JACKET WATER SURGE
30-23	AIR VOLUME TANK
30-24	AIR VOLUME TANK
30-30	DEMETHANIZER
31-1	DEETHANIZER
31-2	FLASH CAN
31-5	LIQUID CONTACTOR
31-6	IRON SPONGE
V-1	STILL
V-2	CHARCOAL FILTER
V-3	SOCK FILTER
V-4	SOCK FILTER
V-5	CHARCOAL FILTER
V-6	SIDESTREAM CHARCOAL FILTER
V-9	REFRIGERATION SUCTION SCRUBBER
V-10	REFRIGERATION DISCHARGE SCRUBBER
V-11	STILL
V-12	AMINE FLASH CAN
V-13	ACID GAS SCRUBBER
V-33	AIR VOLUME TANK
V-101	AMINE FLASH CAN

TANKS

T-1	SOUR PRODUCT
T-2	SOUR PRODUCT
T-3	SWEET PRODUCT
T-4	SWEET PRODUCT
T-5	LUBE OIL
T-6	METHANOL
T-7	CONDENSATE
T-8	SWEET PRODUCT
T-9	REFRIGERANT PROPANE
T-10	LUBE OIL
T-11	AMINE
T-12	ANTIFREEZE
T-13	SLOP OIL
T-14	DIESEL FUEL
T-15	GASOLINE
T-16	PROPANE MOTOR FUEL
T-17	METHANOL
T-18	METHANOL
T-19	HOT OIL
T-20	HOT OIL
T-21	RAW WATER
T-22	SOFT WATER
T-23	ENGINE JACKET WATER
T-24	ENGINE JACKET WATER

COOLING FANS

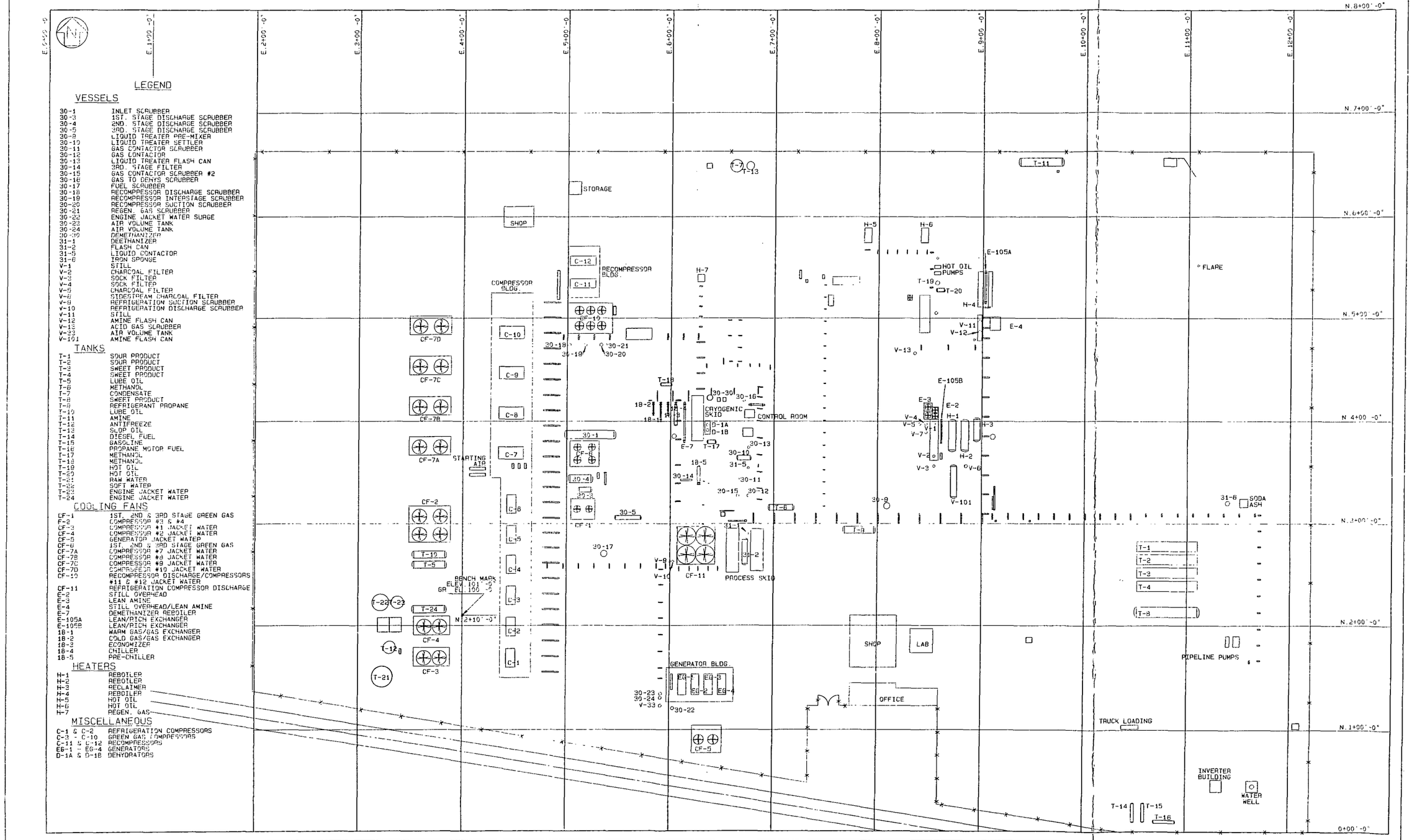
CF-1	1ST. 2ND & 3RD STAGE GREEN GAS
F-2	COMPRESSOR #3 & #4
CF-3	COMPRESSOR #1 JACKET WATER
CF-4	COMPRESSOR #2 JACKET WATER
CF-5	GENERATOR JACKET WATER
CF-6	1ST. 2ND & 3RD STAGE GREEN GAS
CF-7A	COMPRESSOR #7 JACKET WATER
CF-7B	COMPRESSOR #8 JACKET WATER
CF-7C	COMPRESSOR #9 JACKET WATER
CF-7D	COMPRESSOR #10 JACKET WATER
CF-10	RECOMPRESSOR DISCHARGE/COMPRESSORS #11 & #12 JACKET WATER
CF-11	REFRIGERATION COMPRESSOR DISCHARGE
E-2	STILL OVERHEAD
E-3	LEAN AMINE
E-4	STILL OVERHEAD/LEAN AMINE
E-7	DEMETHANIZER REBOILER
E-105A	LEAN/RICH EXCHANGER
E-105B	LEAN/RICH EXCHANGER
18-1	WARM GAS/GAS EXCHANGER
18-2	COLD GAS/GAS EXCHANGER
18-3	ECONOMIZER
18-4	CHILLER
18-5	PRE-CHILLER

HEATERS

H-1	REBOILER
H-2	REBOILER
H-3	RECLAIMER
H-4	REBOILER
H-5	HOT OIL
H-6	HOT OIL
H-7	REGEN. GAS

MISCELLANEOUS

C-1 & C-2	REFRIGERATION COMPRESSORS
C-3 - C-10	GREEN GAS COMPRESSORS
C-11 & C-12	RECOMPRESSORS
EG-1 - EG-4	GENERATORS
D-1A & D-1B	DEHYDRATORS



GENERAL NOTES	GENERAL NOTES	DWG. NO	REFERENCE DRAWINGS	NO.	REVISION	BY	DATE	CHK.	APPR

NO.	REVISION	BY	DATE	CHK.	APPR
1	REV. PER FIELD	LP	11/28		
2	ADDED LEGEND PER FIELD	LP	6/80		

AR OR NO

ISSUE	DATE	PRELIM.	CONST.

WARREN PETROLEUM COMPANY
A DIVISION OF CHEVRON U.S.A. INC.
TULSA, OKLAHOMA

PLANT LAYOUT

PLT. #139 VADA TATUM, N.M.

DRAWN RCK	DATE 12/80	SCALE 1"=40' 5-9-2
CHECKED	DATE	1. [illegible]600-2
APPR	DATE	

SECTION II

ORIGINAL DISCHARGE PLAN FOR VADA
GAS PROCESSING PLANT

JULY 27, 1981

Warren Petroleum Company

MANUFACTURING DEPARTMENT

July 27, 1981

P. O. Box 1589
Tulsa, Oklahoma 74102

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey
Division Director

Re: Discharge Plans
Vada Plant

Gentlemen:

Warren Petroleum Company, a division of Gulf Oil Corporation, is submitting the following formal waste water discharge plan for the Vada Gas Processing Plant located in Section 23, Township 10S and Range 33E, Lea County, New Mexico.

The liquid waste from the plant consists of general plant run-off into 2 different sumps and water from the inlet scrubber. This liquid waste is pumped into 2 metal API tanks located on the surface within the plant perimeter. A vapor recovery system is also included in each tank. The liquid waste is then accumulated and trucked out for separation by an independent firm. The firm sells the oil and disposes of the water in an injection well.

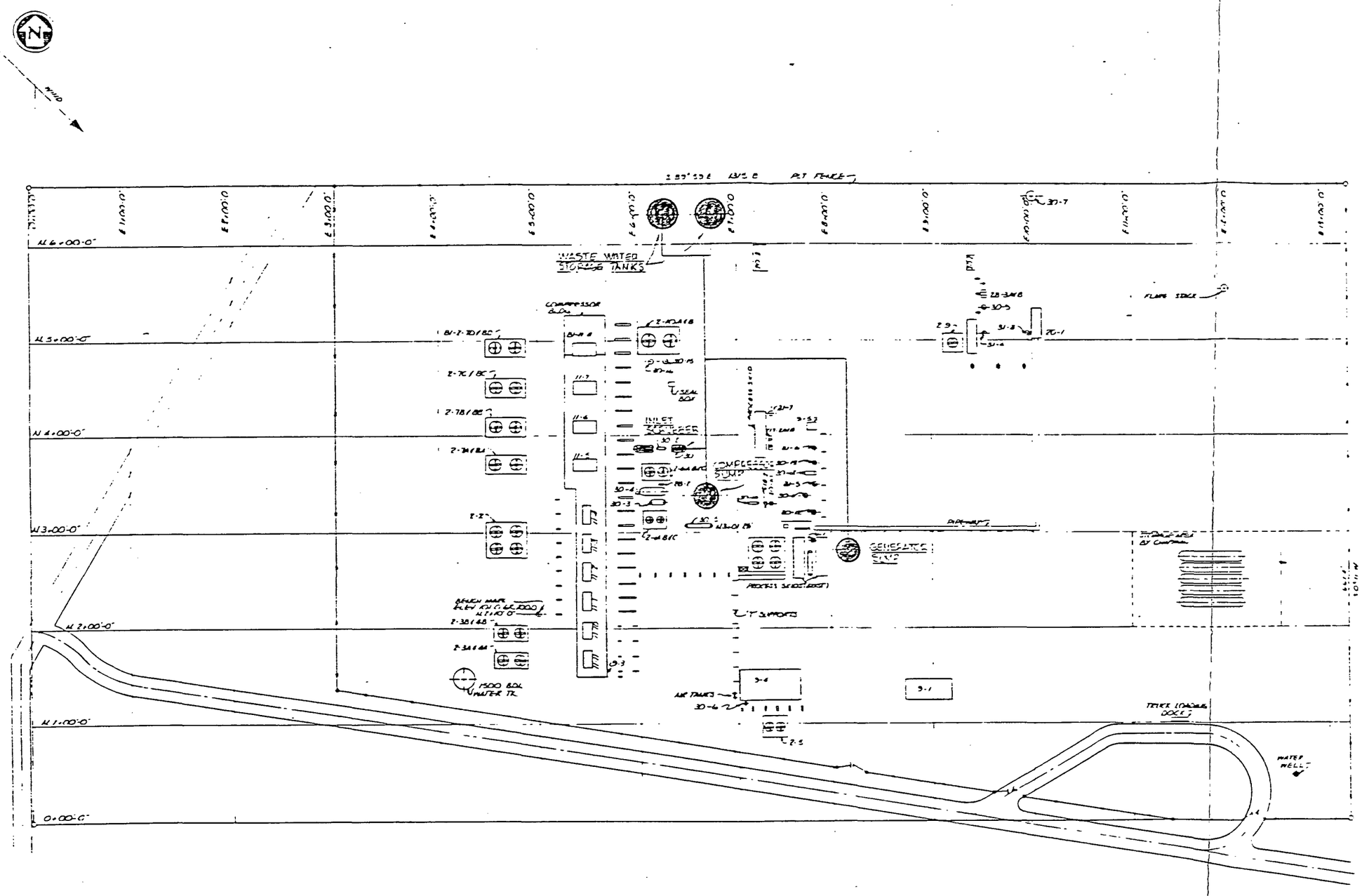
We hope this plan, with attached map, meets your approval. Should you have any questions or desire additional information, please call either Lynn Reed or me at (918) 560-4117.

Very truly yours,

D. Sue J. Johnson

for J. E. Moody, Manager
Environmental and Services

JEM:KCC:de
Attachment



AIR COMPRESSORS

1-1 STARTING AIR COMP
1-2 INST AIR COMP

HEAT EXCH

1-A&B/C GAS COOLERS (FOR B&C)
2-1 JW COOLERS (FOR GAS COMP)
2-2 & 2-3 JW COOLERS (FOR REFRIG COMP)
2-A&B/C LO COOLERS (FOR REFRIG COMP)
2-5 JW COOLER (FOR GEN ENGINE)
2-A&B/C GAS COOLERS (FOR AMINE)
2-1 A&B/C JW COOLERS (FOR AMINE)
2-A&B/C LO COOLERS (FOR AMINE)
2-3 AMINE COOLER
2-REGEN REGEN COOLERS

BLDGS

3-1 OFFICE / WAREHOUSE
3-2 GAS COMP BLDG
3-3 REFRIG COMP BLDG
3-4 GENERATOR BLDG
3-5 CONTROL BLDG

COMPRESSORS

1-1 & B/C GAS COMPRESSORS
1-5 & GMW-8 TF GAS COMPRESSORS
1-A&B/11 REFRIG COMPRESSORS

DEHYDRATORS

17-1 GLYCOL DEHYDRATOR UNIT (TEMPORARY)
17-2 A1& DEHYDRATOR

EXCHANGERS - SHELL / TUBE

8-1 LO COOLERS
8-2 CHILLER

HEATERS / FURNACES

30-1 DIRECT FIRED HEATER (BY CHEMRAN)
30-2 HOT OIL HEATER
30-3 REGEN GAS HEATER

GENERATORS

11-1 & GENERATOR

PUMPS

28-1 JW CIR PUMP
28-2 COND PUMP
28-3 A1& HOT OIL PUMPS

TANKS / SCRUBBERS

30-1 1ST STAGE GAS S/C SCRUB
30-2 CONDENSATE SKID UNIT
30-3 2ND STAGE GAS S/C SCRUB
30-4 3RD STAGE GAS S/C SCRUB
30-5 3RD STAGE GAS DISCH SCRUB
30-6 GEN JW SURGE TANK
30-7 COND STORAGE 750 BBL
30-8 GLYCOL SKID (TEMPORARY)
30-9 HOT OIL SURGE
30-10 INLET SCRUBBER
30-11 OUTLET SCRUBBER
30-12 AMINE SETTLER
30-13 FLASH TANK
30-14 FILTER
30-15 REGEN GAS SCRUB
30-16 RGS S/C SCRUB

TOWERS

31-1 DEETHANIZER
31-2 GAS CONTACTOR
31-3 AMINE TREATER
31-4 AMINE TREATER
31-5 LIQUID CONTACTOR
31-6 GLYCOL CONTACTOR
31-7 DEMETHANIZER

GENERAL NOTES	GENERAL NOTES	DWG. NO.	REFERENCE DRAWINGS	NO.	REVISIONS	BY DATE CHK APPR	NO.	REVISIONS	BY DATE CHK APPR
							1	REVISED PER PLANT AS BUILT	6-L

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA

PLANT LAYOUT

P.T. 139 V&OA

DRAWN BY / INITIAL	DATE	SCALE
CHECKED	DATE	139-101-C
APPROVED	DATE	

SECTION III

UPDATE OF ORIGINAL DISCHARGE PLAN FOR VADA GAS PROCESSING PLANT

SEPTEMBER 30, 1984

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
ORIGINAL DISCHARGE PLAN FOR
VADA GAS PROCESSING PLANT
JULY 27, 1981

The method of disposal for liquid waste has not changed from that described in the original plan. A copy of this plan submitted to the the NMOCD on July 27, 1981 directly follows.

SECTION IV

TOPOGRAPHIC MAP

Dug Well 4203
Antelope Windmill 4208
Pit
Oil Well 4196
Oil Well 4194
Oil Well 4192
WARREN VADA PLANT
Pumping Sta
WT
Radio Tower
Gravel Pit
North Baker Windmill 4198
McBride Windmill 4201
Oil Well 4198
WM 4197
Oil Well 4203
Oil Well 4192
Oil Well 4221
Gravel Pit
Oil Well
Baker Windmill 4196
South Well 4214
Oil Well
Oil Well 4197
Oil Well 4233
PIPELINE
PIPELINE
SIMANOLA
INBEL OIL
VALLE
FIELD
(JOHNSON RANCH) 5350 IV NW
3702
3701
3700
3699
3698
3697
25'
R 33 E
R 34 E
16 15 14 13 18
17
21 22 23 24 19
20
28 27 26 25 30
29
33 34 35 36 31
32

SECTION V

GENERAL DESCRIPTION - GAS PROCESSING INDUSTRY AND SPECIFIC REFERENCES FOR THE VADA PLANT

SECTION V

GENERAL DESCRIPTION - GAS PROCESSING INDUSTRY

Natural Gas Processing Plants extract liquid hydrocarbons from raw natural gas. Please refer to the block flow diagram which directly follows.

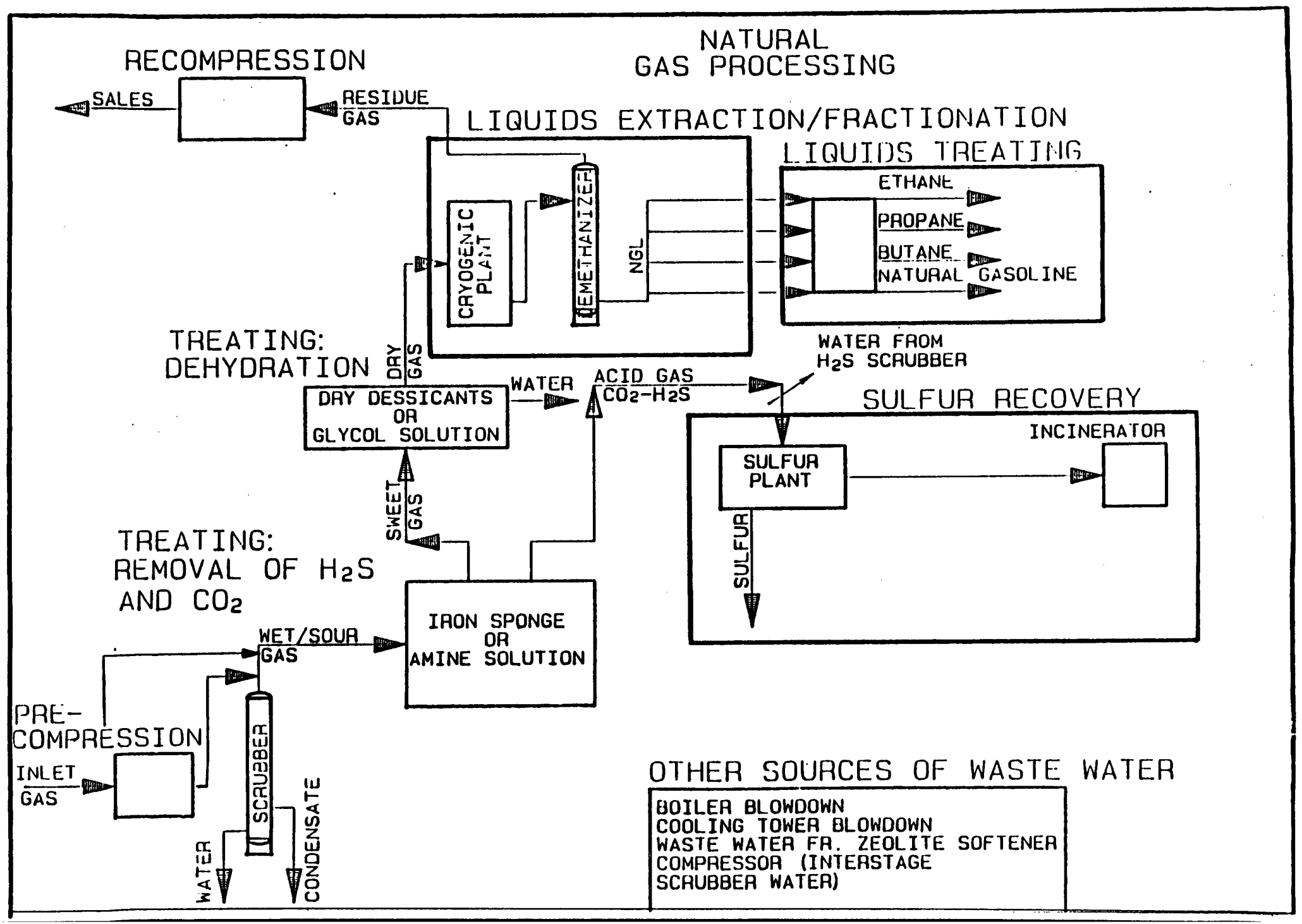
The liquid hydrocarbon components of natural gas are ethane (C^2), propane, (C^3), butane (C^4) and natural gasoline (C^{5+}). The remaining gas, from which the liquids are extracted, is almost entirely methane (C^1).

Treating for the removal of Hydrogen Sulfide and Carbon Dioxide

The raw natural gas, termed inlet gas, may contain varying amounts of impurities. The most common contaminants are water, hydrogen sulfide (H^2S), and carbon dioxide (CO^2). The gas is compressed and then enters the first phase of natural gas processing which is treatment to remove the impurities.

The term acid gas refers to the presence of H^2S and CO^2 in the raw natural gas. Sour gas has a high concentration of sulfur components. Sweet gas has small quantities of sulfur compounds, usually less than 0.25 grains of H^2S per 100 standard cubic feet of gas and, as such, bypasses iron sponge or amine treating.

The acid gas may be removed from the inlet gas stream by an absorption process where the incoming stream contacts a liquid that selectively reacts with and removes the acid gas. This liquid, mono- or diethanolamine is regenerated by heat thereby driving off the gases. The resultant amine liquid then reacts with more acid gas in a continuing cycle of reaction then regeneration. The gases released from the amine may then be combusted to SO^2 in a flare stack, or incinerator. If the acid gas exists in a large concentration, it will not be combusted, but will enter a sulfur recovery plant which removes elemental sulfur from the stream. Any unoxidized H^2S, which occurs in small amounts, is oxidized to SO^2 by the sulfur plant incinerator. This incinerator is located after the last sulfur plant catalytic bed. Also note that an H^2S scrubber may exist prior to the entry of the gas stream into the sulfur plant. This scrubber removes water from the gas.


NATURAL
GAS PROCESSING
RECOMPRESSION
SALES
RESIDUE
GAS
LIQUIDS EXTRACTION/FRACTIONATION
LIQUIDS TREATING
CRYOGENIC
PLANT
DEMETHANIZER
NGL
ETHANE
PROPANE
BUTANE
NATURAL GASOLINE
TREATING:
DEHYDRATION
DRY
GAS
DRY DESSICANTS
OR
GLYCOL SOLUTION
WATER
ACID GAS
CO2-H2S
WATER FROM
H2S SCRUBBER
SULFUR RECOVERY
INCINERATOR
SULFUR
PLANT
SULFUR
SWEET
GAS
TREATING:
REMOVAL OF H2S
AND CO2
IRON SPONGE
OR
AMINE SOLUTION
WET/SOUR
GAS
PRE-
COMPRESSION
INLET
GAS
SCRUBBER
WATER
CONDENSATE
OTHER SOURCES OF WASTE WATER
BOILER BLOWDOWN
COOLING TOWER BLOWDOWN
WASTE WATER FR. ZEOLITE SOFTENER
COMPRESSOR (INTERSTAGE
SCRUBBER WATER)

Treating for the Removal of Water

The inlet gas, now minus the acid gas components, enters the next phase of gas processing. This is the removal of water from the gas.

The water may be removed by an absorption or an adsorption process. Both processes may be used in tandem.

Triethylene glycol removes water from the gas by absorption. The glycol is then reconcentrated by removal of the water with heat. This is a continuous cycle. Either alone, or in conjunction with the glycol system, a molecular sieve dehydration system may exist. The molecular sieve is a dessicant which absorbs water from the gas and is regenerated by heat to restore its absorptive capability.

Whether removed by glycol or molecular sieve, the water driven off during regeneration exists in the steam phase, then condenses through exchangers and leaves the process as a liquid.

Natural Gas Processing - Removal of Gas Liquids

The extraction of the gas liquids from the gas stream, which is now sweet and dry, is accomplished in several ways. Warren's New Mexico Plants use the cryogenic method. Basically, the gas stream is cooled and the non-methane hydrocarbons are then condensed and recovered. In some instance, the liquids are also treated to remove water and/or acid gas components.

Natural Gas Processing - Fractionation of Natural Gas Liquids

The natural gas liquids that have been separated out of the inlet stream are fractionated into their individual components. Many of Warren's plants do not fractionate the liquids. These plants remove the gas liquids by pipeline.

Separation of the hydrocarbon components is possible because of the difference in their physical properties, specifically, their boiling points. The distinct gas liquids, along with the purified natural gas, are sold commercially.

The following document, "The Gas Processing Industry: Its Function and Role in Energy Supplies" published by the Gas Processors Association, will provide further details about the industry.

The Gas Processing Industry:

Its Function and Role
in
Energy Supplies

Gas Processors Association
1812 First Place
Tulsa, OK 74103

INTRODUCTION

The gas processing industry is a major segment of the oil and gas industry, distinct from either crude oil or natural gas production, separate from oil refining or gas distribution, yet indispensable to all. As a separate and identifiable function, it is probably the least known and least understood part of the petroleum industry.

In simple terms, the gas processing industry refines raw natural gas from the earth into saleable, useful energy forms for use in a wide variety of applications. Through the gas processing industry's plants flows approximately 60% of the nation's petroleum energy production, which emerges in the form of merchantable natural gas, liquefied petroleum gases, motor fuel components, and raw materials for a myriad of basic petrochemicals.

Natural gas occurs deep below the surface of the earth in two principal forms: associated gas and non-associated gas.

Associated gas is found in crude oil reservoirs, either dissolved in the crude oil, or in conjunction with crude oil deposits. It is produced from oil wells along with the crude. It separates, or is separated from, the oil at the casinghead of the well, which leads to the synonymous term "casinghead gas." It may also be called "oil-well gas" or "dissolved gas." In the industry's beginning, virtually all processed gas was from oil wells.

Non-associated gas occurs in reservoirs separate from crude oil. Its production is not incidental to the production of crude oil. It is commonly called "gas-well gas" or "dry gas." Today about 75% of all natural gas produced is non-associated gas.

In addition, the reservoirs of many oil fields found since 1935 produce neither true gases nor true liquids. The material might properly be called a "two-phase fluid." It is neither a gas because of its high density, nor a liquid because no surface boundary exists between gas and liquid. These reservoirs, called "gas condensate" reservoirs, are usually deeper with higher pressures, which pose special problems in production and processing.

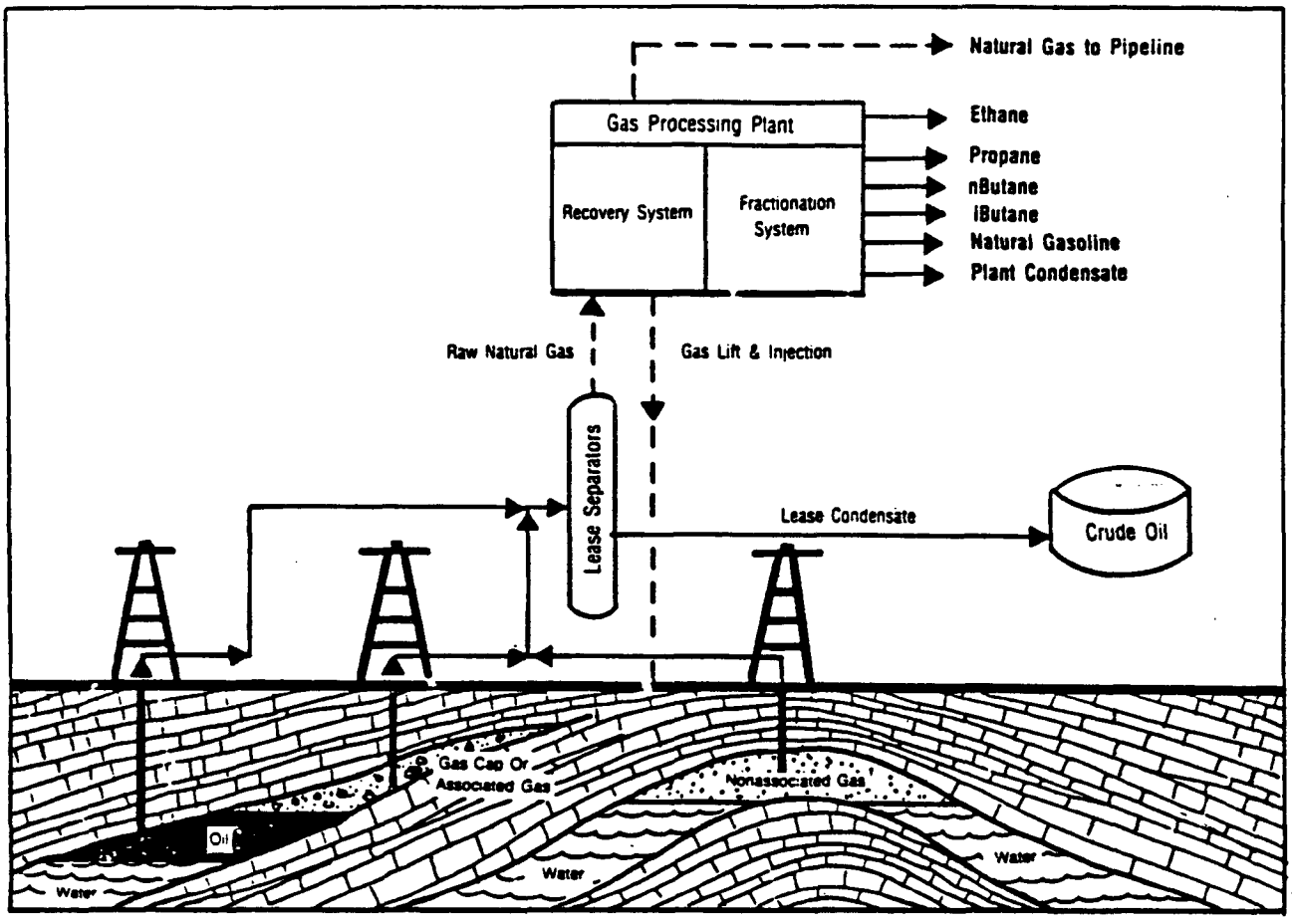
From whatever reservoir, natural gas as produced from the earth has widely varying composition, depending on the field, the formation, or the reservoir from which it is produced. The principal constituents of natural gas are methane and ethane, but most gases contain varying amounts of heavier components, such as propane, butane, pentane, and heavier hydrocarbons that may be removed by any of a number of processing methods.

The removal of individual hydrocarbons by processing is possible because of the differences in physical properties. Each component has a distinctive weight, boiling point, and other physical characteristics, making its separation from other components a relatively simple physical operation.

Gas processors describe gas as "rich" (wet), or "lean" (dry) depending on its content of heavy components. These are relative terms, but as used in the industry, a rich gas may contain five or six gallons or more of recoverable hydrocarbons per thousand cubic feet; a lean gas usually contains less than one gallon of recoverable liquids per thousand cubic feet.

Natural gas may also contain water, hydrogen sulfide, carbon dioxide, nitrogen, helium, or other components that may be diluents and/or contaminants. In any case, natural gas as produced rarely is suitable for pipe line transportation or commercial use. Natural gas in commercial distribution systems is composed almost entirely of methane and ethane, with moisture and other contaminants removed to very low concentrations.

Therefore, all natural gas is processed in some manner to remove unwanted



water vapor, solids and/or other contaminants that would interfere with pipe line transportation or marketing of the gas. In addition, and equally important, most natural gas is processed to separate from the gas those hydrocarbon liquids that have higher value as separate products.

These natural gas liquids (NGL's) are part of a family of saturated hydrocarbons called paraffins. Each compound has a chemical formula C_nH_{2n+2}. The principal natural gas liquids include:

Ethane: Exists as a liquid only under very high pressures (800 psi) or at extremely low temperatures (−135°F). It is recovered and transported in either the liquid or gaseous state principally for use as feedstock for ethylene, the most important basic petrochemical produced today.

Propane: Recovered and handled as a liquid at pressures over 200 pounds, or at temperatures below −44°F. Its principal uses are as feedstock for production of ethylene and propylene, and as LP-gas for heating fuel, engine fuel, and industrial fuel.

Butane: Recovered and handled as a liquid under moderate pressure. Its principal uses are to provide needed volatility to gasoline motor fuel; as domestic LP-gas fuel, either alone or in mixtures with propane; and as a feedstock for the manufacture of butadiene, a key ingredient of synthetic rubber.

Iso-butane: The chemical isomer of butane, it is fractionated and produced as a separate product principally for the manufacture of alkylate, a vital ingredient of high-octane motor gasoline.

Natural Gasoline: A mixture of pentanes and heavier hydrocarbons, with small amounts of butane and iso-butane. Industry specifications define its physical

properties in terms of vapor pressure at 100°F (10 to 34 psi), and percentage evaporated at 140°F (25 to 85%). It is recovered as a liquid, principally for use as a motor fuel component.

If the gas contains hydrogen sulfide, a poisonous gas, it is removed and further processed for recovery of elemental sulfur. Most carbon dioxide is removed to prevent destructive corrosion and to inject into crude oil reservoirs for enhanced oil recovery (EOR). Some helium is extracted for its unique properties as an inert gas.

In addition, gas processing performs vital functions, both economically and technically, in the recovery of crude oil through reservoir pressure maintenance, miscible floods, and other secondary recovery methods. Many of these projects would not be economically possible except for the revenues generated by extraction and sale of natural gas liquids.

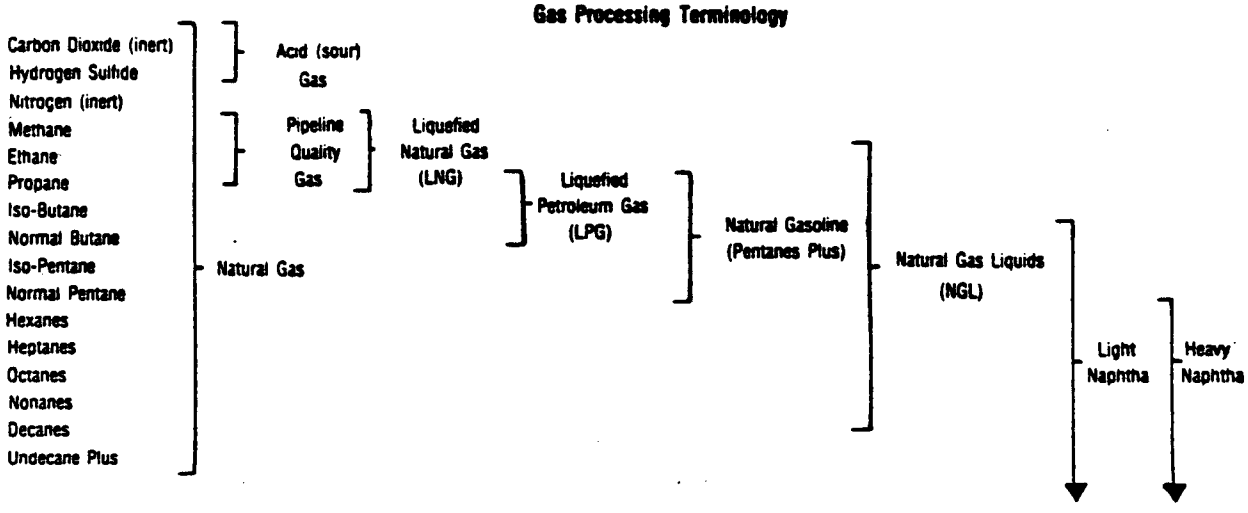
PROCESSING AND MANUFACTURE

Natural gas processing involves two basic operations: (1) extraction of the natural gas liquids from the gas stream; and (2) fractionation of the natural gas liquids into their separate components. Additional processing is usually required to treat and condition both the natural gas and the gas liquids.

Natural gas processing may be as simple as drying the gas by passing it through a fixed bed of a desiccant material, or it may be as complex as complete liquefaction of the total gas stream by cooling to extremely low temperatures. Extraction of heavier gas liquids (pentane and heavier) can be achieved by simple compression and moderate cooling of the natural gas stream.

However, the modern gas processing industry uses a variety of sophisticated processes to treat natural gas and extract natural gas liquids from the gas stream. The two most important extraction processes are the absorption and cryogenic expander processes. Together, these processes account for an estimated 90% of total natural gas liquids production.

Gas Processing Terminology



ABSORPTION PROCESS

The basic step in the absorption process is removal of NGL components from the natural gas by contact with an absorbing oil. Liquid recovery is enhanced by refrigerating the absorption oil. Recovery levels may also be increased by lowering the molecular weight of the absorption oil. Depending on operating conditions, approximately 85% of the propane and essentially all of the heavier natural gas liquids are absorbed in the oil. The lighter fractions – methane, ethane, and some of the propane – are not recovered in the absorbing oil and pass through the absorber tower as merchantable pipeline quality natural gas.

The bottoms effluent from the absorption tower consists of rich absorption oil mixed with absorbed propane, butanes, pentanes, and other heavier natural gas liquids. This stream is then fed to lean oil stills where the absorbed liquids are distilled from the absorber oil by heating the mixture to a temperature above the boiling point of the natural gas liquids, but below that of the absorber oil. The stripped absorber oil is then recirculated to the absorption tower, and the mixed stream of natural gas liquids is piped to the fractionation system for further separation into individual NGL components.

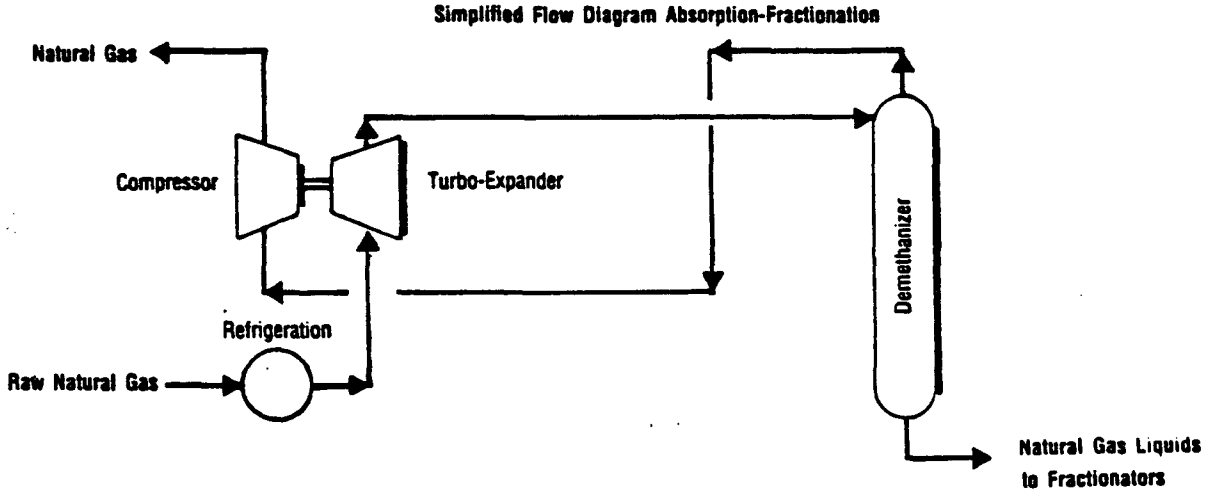
The fractionation system may be an integral part of the gas processing plant, or it may be a "central fractionator" many miles from the primary production. A central fractionator may receive mixed streams of natural gas liquids from many plants.

TURBO EXPANDER PROCESS

In recent years, ethane has become increasingly desirable as a petrochemical feedstock. This has resulted in the construction of many plants that recover ethane and heavier hydrocarbons from natural gas at temperatures ranging down to minus 150°F.

Combinations of external refrigeration and liquid flash-expansion refrigeration with gas turbo expansion cycles are employed to attain the low temperatures desired for high ethane recovery.

In the turbo-expander process, the absorber and still facilities are replaced by an expansion turbine, which accomplishes the separation of gas liquids from the natural gas stream by auto-refrigeration to extremely low temperatures.



Recoveries of 90-95% ethane and all of the heavier hydrocarbons have been achieved with the expander process. The mixed liquid product from the expander plant is then fractionated or may be delivered by pipeline to a central fractionation facility for fractionation into separate NGL components.

FRACTIONATION

Fractionation of a mixed NGL stream into separate components is accomplished by controlling the temperature of the stream in a fractionator to take advantage of the difference in boiling points of separate products. Fractionators are usually named for the overhead or top product. Therefore, a deethanizer implies that the top product is ethane; a depropanizer indicates that the top product is propane, etc. Natural gas liquids are normally fractionated by boiling the lighter products from the heavier products in the following order:

Deethanizer: The first step in the fractionating sequence is to separate the ethane and propane, with the ethane going overhead and the propane and heavier components passing from the bottom of the fractionator.

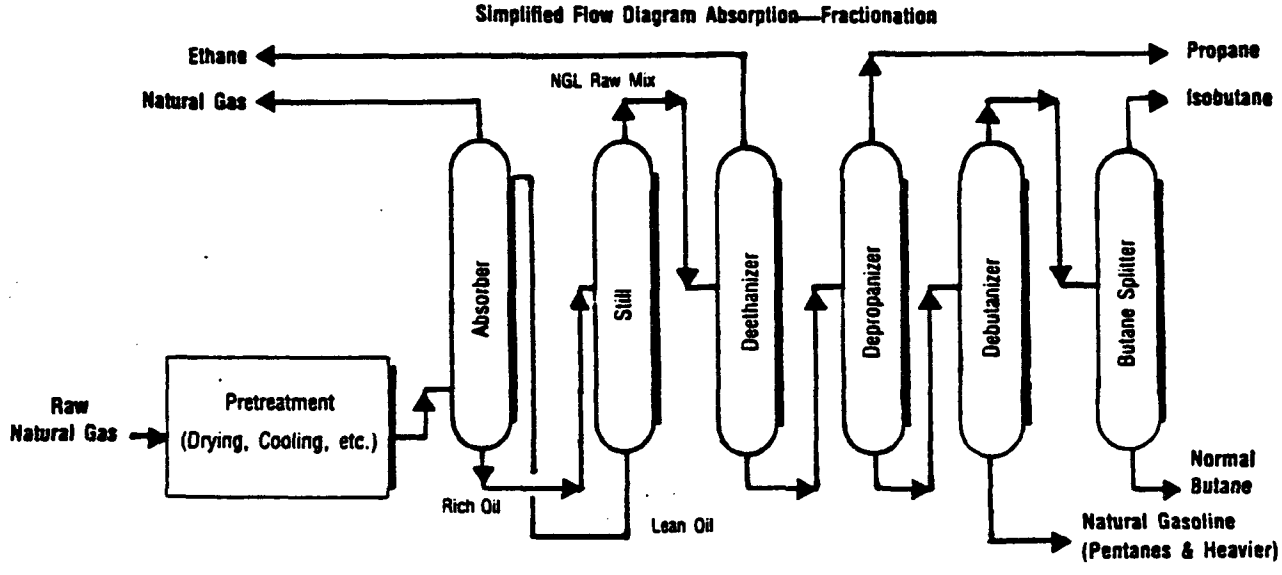
Depropanizer: The next step in the processing sequence is to separate the propane and the isobutane, with the propane going overhead and the isobutane and heavier components passing from the bottom of the depropanizer.

Debutanizer: The next fractionation step is separation of the butanes from the pentanes plus stream. The butanes (both iso and normal) pass overhead and the pentanes plus pass from the bottom of the fractionator.

Butane Splitter or Deisobutanizer: When it is desirable to do so, the butanes which pass overhead from the debutanizer may be separated into iso and normal butanes. The isobutane goes overhead and the normal butane is drawn from the bottom of the tower.

OTHER ROUTINE GAS PROCESSING

As noted earlier, both natural gas and natural gas liquids may require additional treating or processing, either before or after extraction of liquids.



The most common treatment of natural gas is removal of excess water vapor, which is necessary to prevent formation of hydrates and freezing in pipeline transmission systems. Techniques for dehydrating natural gas include:

–Absorption using liquid desiccants, usually a glycol compound

–Adsorption, using solid desiccants such as silica gel, activated alumina, or molecular sieves

–Dew point depression by injection of anti-freeze compounds such as glycols or alcohols

–Expansion refrigeration which cools the gas stream below the dew point of entrained water vapor.

Removal of excess moisture from some natural gas liquids, principally propane, is also necessary and is accomplished most often with solid desiccants or molecular sieves.

Additional treatment of both natural gas and natural gas liquids is usually required to remove hydrogen sulfide and carbon dioxide. This process in the industry is called "sweetening." Many process methods are used, most of which rely on either chemical reactions, physical solution, or adsorption. Each process has unique advantages, depending on the concentration of hydrogen sulfide, carbon dioxide, and other conditions.

The most common chemical processes are based on contact with amine solutions. These solutions react with unwanted acid gas constituents to form other compounds which can then be removed.

Physical solvent processes include a number of patented chemicals and processing schemes which function much the same as the oil absorption process for removal of liquids from gas.

Adsorption processes involve the removal of unwanted components by passing the gas or liquid through a bed of solid material that has been designed or treated to selectively extract carbon dioxide, hydrogen sulfide, or other contaminants.

SULFUR RECOVERY

The sour gas effluent from a sweetening unit must be further treated, either for disposal or for recovery of sulfur contained in the gas. At plants where hydrogen sulfide concentrations are very low, it is not economical to install sulfur recovery facilities. In these cases, the sour gas is disposed of by incineration.

At higher concentrations, the sour gas is usually processed in a sulfur recovery facility to recover elemental sulfur. The Claus process is the most widely used process for converting hydrogen sulfide into elemental sulfur. The process utilizes thermal and catalytic reactions to achieve conversion of up to 97% of hydrogen sulfide to elemental sulfur. "Tail gas clean up" processes reduce sulfur emissions significantly and boost overall efficiency of sulfur recovery to 98+%.

OTHER SPECIALIZED GAS PROCESSING

Depending on gas composition and other factors, the gas processing function may also include additional processing such as:

- Carbon dioxide removal and transport for enhanced oil recovery
- Helium recovery for commercial sale
- Nitrogen removal to increase heating value of the gas
- Liquefaction of the total gas stream to produce liquefied natural gas.

All of these process functions require specialized processes and additional investment.

PROFILE OF THE U.S. GAS PROCESSING INDUSTRY

PROCESSING PLANTS

There are approximately 859 gas processing plants in the United States, most of which are located in five states: Texas, Louisiana, Oklahoma, Kansas, and New Mexico. These five states account for about 86% of total U.S. gas processing capacity, gas processed, and natural gas liquids production.

Plant sizes range from less than 1 million cubic feet per day up to more than 2.5 billion cubic feet per day. The 200 smallest plants (about 25% of total) are less than 10 million cubic feet per day capacity, and account for only about 1% of total industry capacity.

The 200 largest plants (25% of total) have capacities greater than 80 million cubic feet per day and account for nearly 80% of total industry capacity. Approximately 92% of total gas capacity is in 375 plants (44% of total) with capacities greater than 35 million cubic feet per day. Production of natural gas liquids averages less than 2,000 barrels per day per plant, with maximum production ranging up to 25,000 barrels per day in the largest plants.

Approximately 100 of the 859 U.S. gas processing plants include sulfur recovery facilities, with a total capacity of about 4,500 tons per day of elemental sulfur. Sulfur production from gas plants accounts for about 13% of total U.S. sulfur production.

In addition, there are approximately 20 central fractionating plants operating in the United States. These fractionators may handle the mixed natural gas liquids production of a single separation facility, or may process mixed streams from many plants, some of which may be located hundreds of miles away. These fractionators separate these raw mixed NGL streams from recovery facilities into saleable products such as ethane, propane, butane, or specified mixtures, according to the user's needs.

COMPANIES

The U.S. gas processing industry is composed of an estimated 300 companies, ranging in size from the largest integrated oil companies to the single plant owner-operator.

The 20 largest gas processing companies produce about 70% of total U.S. production of natural gas liquids.

U.S. GAS PROCESSING PLANTS

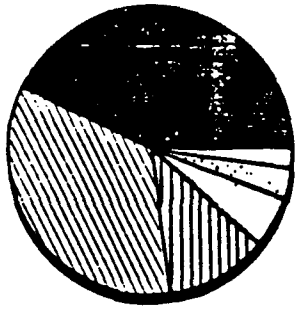
State	No. Plants	Gas Capacity, mmcfd	Gas throughput, mmcfd	NGL Products, m B/D
Texas	411	25,090	13,380	618
Louisiana	100	22,601	14,070	333
Oklahoma	103	4,765	3,110	145
Kansas	23	4,894	2,648	45
New Mexico	41	3,626	2,211	96
	678	60,976	35,419	1,237
Other	181	9,508	5,738	218
U.S. Total	859	70,484	41,157	1,455

NATURAL GAS LIQUIDS SUPPLY/DEMAND

U.S. gas plant production of natural gas liquids totals some 570 million barrels per year, or approximately 1.5 million barrels per day. The distribution of this production during 1984 is as follows:

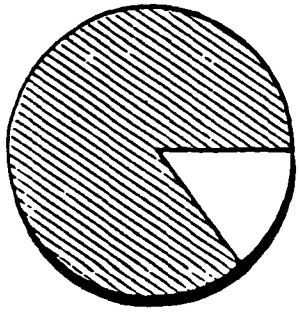
Ethane	28.7%
Propane	34.2%
Normal and Iso-Butane	19.6%
Pentanes plus, including plant condensate	17.5%

PROPANE CONSUMPTION



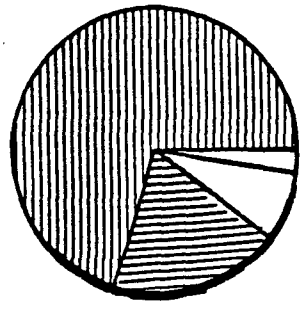
- 2.10% UTILITY GAS
- 3.29% EXPORT
- 5.09% ENGINE FUEL
- 12.57% OTHER
- 34.13% RES & COMM
- 42.82% CHEM & INDUST

ETHANE CONSUMPTION



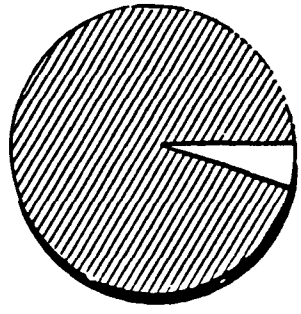
- 13.59% OTHER
- 86.41% CHEMICAL & IND

BUTANE CONSUMPTION



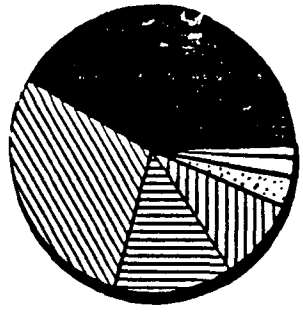
- 1.89% OTHER
- 7.55% EXPORT
- 20.13% CHEM & IND
- 70.43% GASOLINE

PENTANES + CONSUMPTION



- 4.76% CHEM & INDUST
- 95.24% GASOLINE

NGL CONSUMPTION



- 1.13% UTILITY GAS
- 2.13% ENGINE FUEL
- 3% EXPORT
- 9.14% OTHER
- 14.27% RES & COMM
- 28.54% GASOLINE
- 41.79% CHEM & INDUST

PHYSICAL PROPERTIES OF NATURAL GAS LIQUIDS COMPONENTS

Component	Vapor Pressure psia @ 100 F.	Boiling Point @ 14.7 psia	Specific Gravity 60 F./60 F.
Methane	(5,000)	−259	0.3
Ethane	(800)	−127	0.356
Propane	190	−43.7	0.508
n-Butane	51.6	31.1	0.584
i-Butane	72.2	10.9	0.536
n-Pentane	15.6	96.9	0.631
i-Pentane	20.4	82.1	0.625
Hexane	5.0	155.7	0.664
Heptane	1.6	209.2	0.688

In addition, field facilities handling natural gas prior to delivery into a gas processing plant produce an estimated 350 thousand barrels per day of lease condensate, which is usually transported to refineries along with crude oil.

Total U.S. supply of natural gas liquids is augmented by refinery production and imports.

Refineries produce and market about 120 million barrels per year, or about 325 thousand barrels per day, of natural gas liquids, mainly propane. Refinery yields of natural gas liquids amount to 2-3% of total crude oil charged to the refinery.

Total imports of natural gas liquids are approximately 70 million barrels per year, or roughly 200 thousand barrels per day. About 80% of these imports are from Canada.

Approximately 80% of total U.S. natural gas liquids production is consumed in three major uses: petrochemical feedstocks; motor gasoline manufacture; and residential and commercial heating fuels. The remainder is used in a wide variety of applications, including engine fuels, industrial fuels, utility peak shaving, crop drying, and other agricultural and process fuel applications.

TRANSPORTATION AND STORAGE

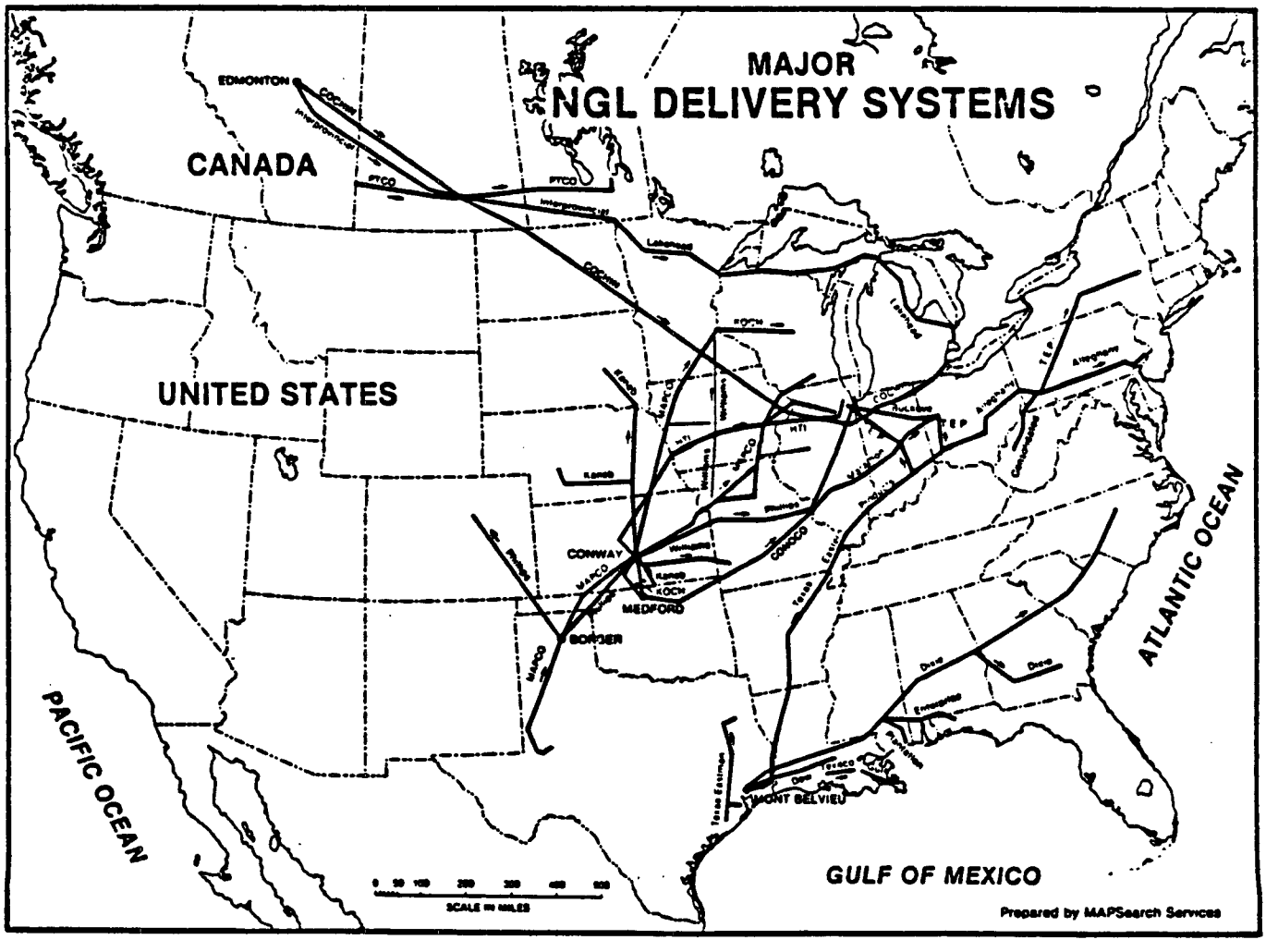
A national network of some 70 thousand miles of high pressure pipelines transport unfractionated NGL streams from production areas to fractionating centers and then transport finished products to major markets.

Four major pipelines extend from the West Texas-New Mexico fields to the major terminal and fractionation center of the U.S. – Mont Belvieu, Texas, located near the petrochemical and refining center of the nation. Other pipeline systems deliver West Texas-New Mexico natural gas liquids to a second major terminal, storage, and fractionation point in central Kansas.

From Mont Belvieu, two major pipeline systems deliver LP-gas fuels to the northeastern and southeastern United States.

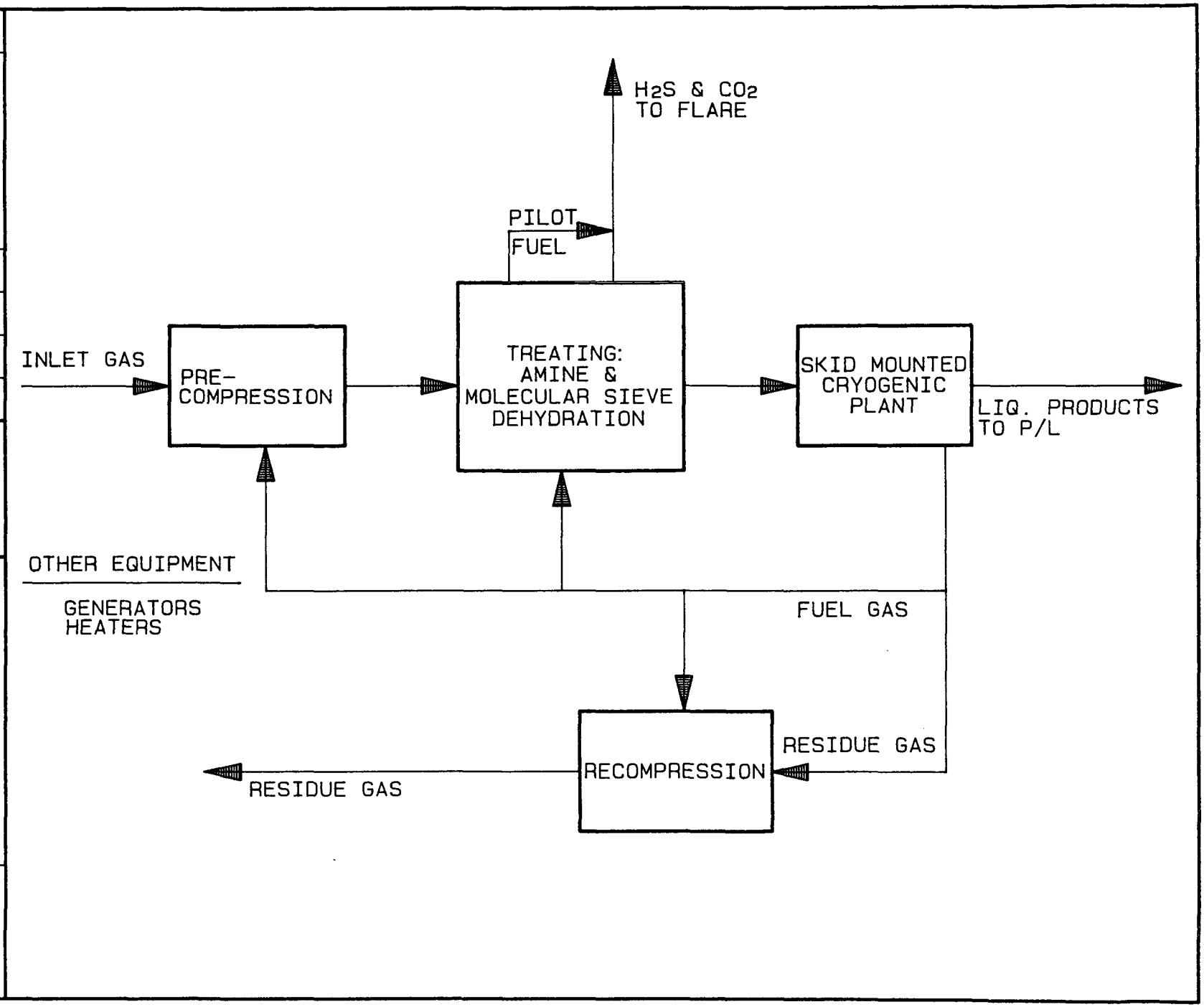
Several pipeline systems extend from central Kansas storage and fractionating facilities into west and upper midwest markets.

Total natural gas liquids production is relatively constant throughout the year. However, depending on weather and other factors, demand may vary considerably. Therefore the industry has installed and operates underground storage facilities totaling nearly half a billion barrels capacity. The bulk of this capacity is located near the refining and petrochemical complexes of the Texas and Louisiana Gulf Coasts, with a second major installation in the midcontinent hub of central Kansas.



Natural Gas Processing for the Vada Plant

The following diagram outlines gas processing for the Vada Plant.



NO.	REVISION	BY	DATE	CHK	APPR

ISSUE CONST.	
DATE	BY

NO. OF UNITS REQUIRED THIS

NO-AFE NO.

WARREN PETROLEUM COMPANY
A DIVISION OF CHEVRON U.S.A. INC.
TULSA, OKLAHOMA

PROCESS FLOW DIAGRAM

PLT. 139 VADA TATUM, N. MEX.

APPR.	DATE
CHECKED	DATE
DRAWN LP	DATE 2-6-85
SCALE NONE	DRAWING NO. 139-2013

Natural Gas Processing for the Vada Plant

The generalized block flow diagram presented at the beginning of this section lists sources of wastewater that are in association with gas processing. These discharges, along with inlet gas scrubber (process) water, are the major sources for disposal for gas processing plants.

The Wastewater System Disposal diagram for the Vada Plant directly follows. This diagram also shows the final disposition of the water.

The compressor sump is constructed of concrete with a metal top. Approximate capacity is 500 gallons.

The generator sump is a metal tank contained within an underground concrete sump. The tank's capacity if approximately 500 gallons.

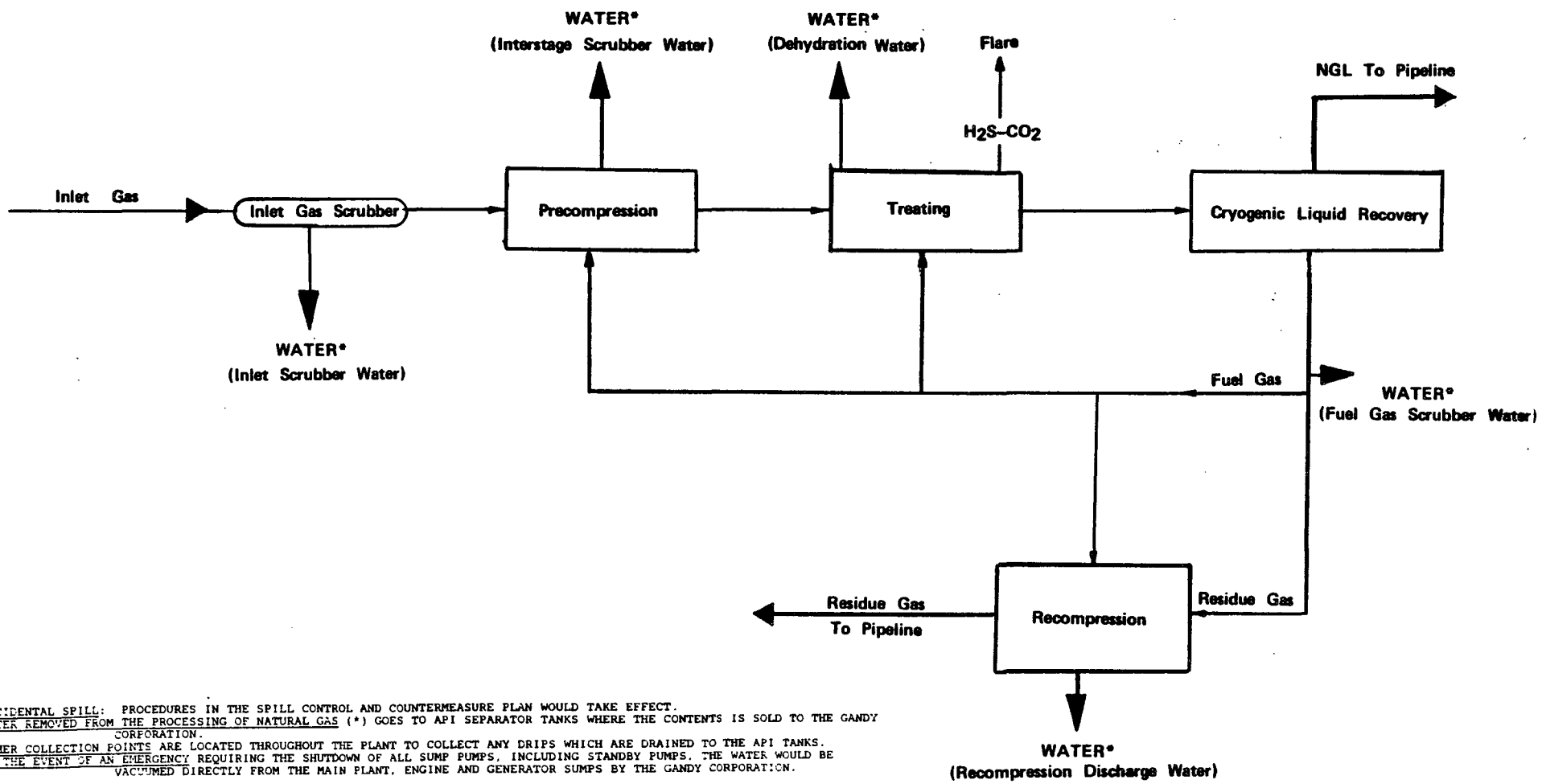
There is a standby sump pump for use in the event of a failure of one or the other two pumps. A portable gasoline pump is also maintained at the plant.

In the event that the API oil tanks should be shutdown and/or all sump pumps should be inoperable, Gandy would be requested to vacuum the wastewater directly from the sumps.

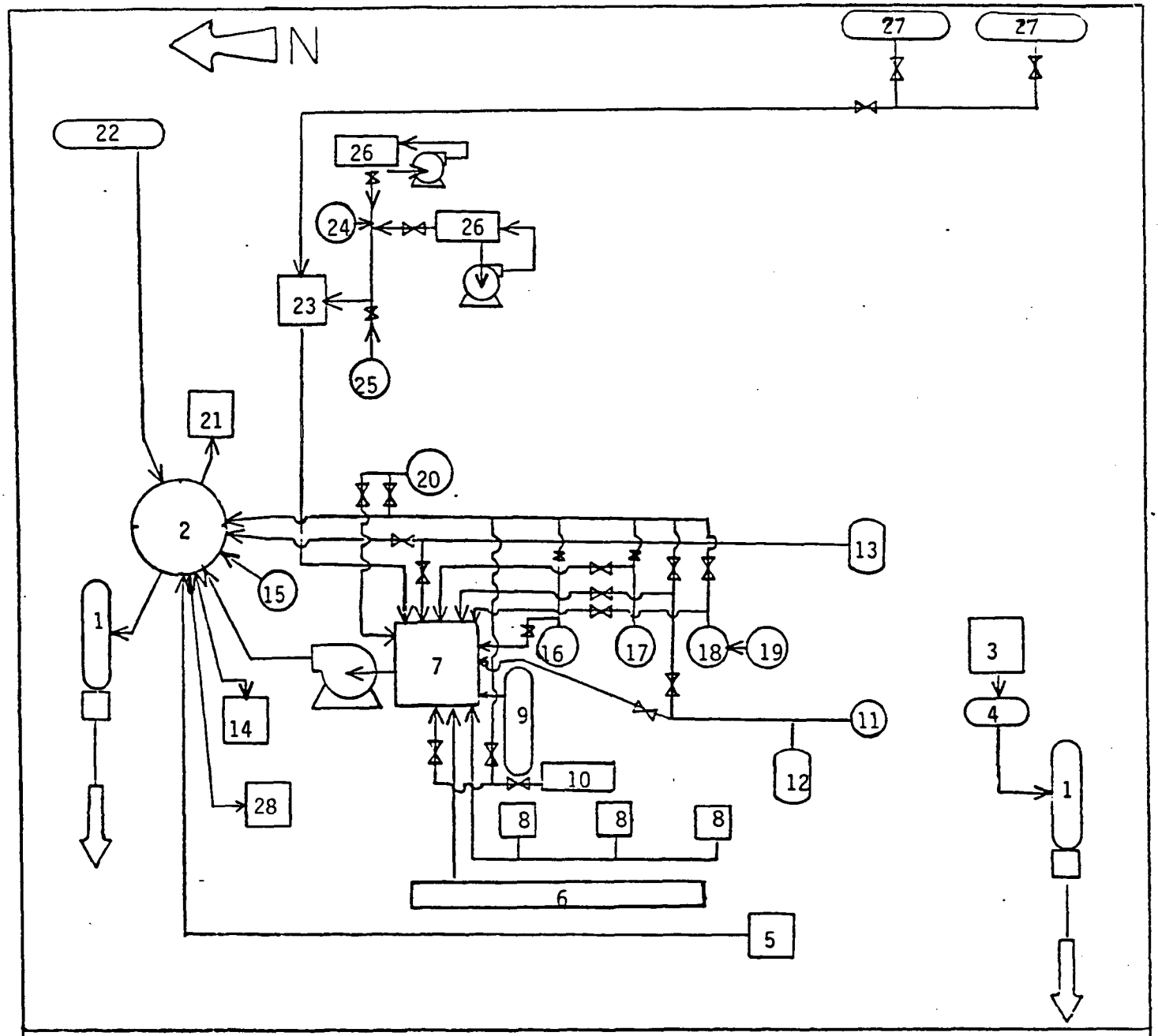
The open drains are at a higher elevation than the main plant sumps, therefore, there could be no backflow. The main sump pump has a capacity of 125 gpm. The portable gasoline back-up pump has a capacity of approximately 60 gpm. Should the main pump ever fail, a vacuum truck would be called out to maintain an acceptable level within the sump.

The current average discharge rate for the Vada plant is 30 BBLs/day. Measurement is by tank strapping.

SUMMARY OF WASTE WATER DISCHARGE--VADA PLANT



ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.
WATER REMOVED FROM THE PROCESSING OF NATURAL GAS (*) GOES TO API SEPARATOR TANKS WHERE THE CONTENTS IS SOLD TO THE GANDY CORPORATION.
OTHER COLLECTION POINTS ARE LOCATED THROUGHOUT THE PLANT TO COLLECT ANY DRIPS WHICH ARE DRAINED TO THE API TANKS.
IN THE EVENT OF AN EMERGENCY REQUIRING THE SHUTDOWN OF ALL SUMP PUMPS, INCLUDING STANDBY PUMPS, THE WATER WOULD BE VACUUMED DIRECTLY FROM THE MAIN PLANT, ENGINE AND GENERATOR SUMPS BY THE GANDY CORPORATION.



1. Vacuum Trucks
2. Scrubber Oil Tanks
3. Generator Sump
4. Generator Scrubber Oil Tank
5. Zeolite Water Treater
6. Engine Room Sump
7. Main Plant Sump
8. Open Drains at Scrubbers
9. Inlet Gas Scrubber
10. Compressor Header Drains
11. Fuel Scrubber
12. 2nd Stage Scrubber
13. 3rd Stage Scrubber
14. Vapor Recovery Unit
15. Glycol Skid
16. Residue Inlet Scrubber
17. Recompressor Discharge Scrubber
18. 2nd Stage Recompressor Scrubber
19. Regen Gas Scrubber
20. Regen Gas Heater Scrubber
21. Earthen Dike-Overflow
22. Field Scrubber
23. Portable Tank Trailer
24. Heating Oil Drain
25. Propane Reclaimer
26. Amine Skids
27. Condensate Storage Tanks
28. Recompressor Bldg.

NO	REVISIONS	BY	DATE	CHK	APPR	BILLED CONST	NO OF PRINTS REQUIRED THIS	WO ARE NO
						ATE	Y	

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM

VADA PLANT #139 TATUM, N. M.

DRAWN BDM	DATE 1-4-85	SCALE
CHECKED	DATE	DRAWING NO
APPROVED	DATE	

Sump/Pump Information for the Vada Plant

The capacity of each sump is as follows:

North Engine Room Sump 7,200 gallons.
South Engine Room Sump 10,200 gallons.
East Sump 13,400 gallons.
West Sump 11,300 gallons.

The capacity of the sump into which all effluent flows is 520 bbls stored in three tanks. Any overflow would go to the brine pit. The effluent in the tanks is then sent to the Rice Engineering well by gravity feed. There is no pump on the discharge line to Rice Engineering. The sump capacities upstream of the three tanks are listed above. We do not have pump curves for the two pumps that deliver effluent to the three tanks.

SECTION VI

HYDROLOGIC & GEOLOGIC DATA

SECTION VI

HYDROLOGIC & GEOLOGIC DATA

All wastewater is removed from the Vada Plant as described throughout this document. Warren does not operate any injection wells for removal of wastewater from this plant.

Since no effluent is allowed the reach the ground, there will be no impact on the groundwaters of New Mexico. As such, it is our interpretation of require-ments for Discharge Plans required by the OCD that a hydrogeologic study will not be appropriate for the Vada Plant. This information was discussed in our meeting of January 17, 1985 with the Oil Conservation Division.

SECTION VII

CHEMICAL ANALYSES

SECTION VII

CHEMICAL ANALYSES

The information provided herein describes the sources and disposition of wastewater from the Vada Plant which has a disposal system whereby no effluent is allowed to reach the ground or to enter a navigable waterway.

Contingency measures would be taken by the plant for wastewater disposal should normally used removal methods ever be rendered inoperable. These procedures have been carefully formulated and would take effect in the event that an emergency would necessitate their implementation.

Section VIII, which follows, contains a current copy of the Spill Prevention Control and Countermeasure (SPCC) Plan for the facility. The SPCC Plan is maintained on site and would be implemented in the event of a spill.

Wastewater sample analyses are attached. To obtain highly consistent analyses of the effluent would be difficult due to the several sources throughout each plant which combine to provide the whole.

For the Vada Plant, the pH and the alkalinity are the first indications that amine entered the waste water. Amine has a low specific conductance but a high total dissolved solid calculated count.

UNICHEM INTERNATIONAL

INDUSTRIAL DIVISION

P.O. BOX 1499
HOBBS, NM 88240
505-393-7751

P.O. BOX 572
BORGER, TX 79007
806-273-6531

P.O. BOX 755
CASPER, WY 82601
307-235-5906

RT. 4 BOX 100
BOBBY LANE
BEAUMONT, TX 77705
409-724-6535

WATER ANALYSIS

ALL RESULTS EXPRESSED IN PPM UNLESS OTHERWISE NOTED

CLIENT NAME: WARREN PETROLEUM COMPANY
FACILITY:
LOCATION: SOUTHEASTERN, N.M.

DATE: 01/30/85
SAMPLE DATE: 01/08/85
DATE ANALYZED: 01/30/85

SAMPLE IDENTIFICATION :		SAUNDERS PLANT WASTE WATER	VADA PLANT WASTE WATER	MONUMENT PLANT WASTE WATER
pH		8.03	10.30	8.10
PHENO ALKALINITY	(CaCO3)	NIL	7000	NIL
TOTAL ALKALINITY	(CaCO3)	256	8700	160
BICARBONATE	(HCO3)	312.3	NIL	195.2
CARBONATE	(CO3)	NIL	3820.0	NIL
HYDROXIDE	(OH)	NIL	1802.0	NIL
TOTAL HARDNESS	(CaCO3)	1368	124	360
CALCIUM	(Ca)	416.0	27.2	113.6
CALCIUM	(CaCO3)	1040	68	284
MAGNESIUM	(Mg)	78.7	13.4	18.2
MAGNESIUM	(CaCO3)	328	56	76
CHLORIDE	(Cl)	364	200	172
CHROMATE	(CrO4)	***	***	***
SULFATE	(SO4)	1927	2410	1497
TOTAL PHOSPHATE	(PO4)	13.3	NIL	7.8
ORTHO PHOSPHATE	(PO4)	11.9	NIL	7.8
POLY PHOSPHATE	(PO4)	1.4	NIL	NIL
SILICA	(SiO2)	112.4	27.7	93.5
SILICA	(CaCO3)	187.7	46.3	156.1
SPECIFIC CONDUCTANCE	(umhos)	1705	1240	845
IRON	(Fe)	1.10	1.30	2.50
COPPER	(Cu)	0.08	NIL	NIL
CALCULATED :				
TOTAL DISSOLVED SOLIDS		3881	14894	2840
SODIUM	(Na)	657	6594	742

ANALYZED BY: _____ (HOBBS LAB)

APPROVED BY: _____

*** INDICATES THAT THIS TEST WAS NOT RUN

UNICHEM INTERNATIONAL

INDUSTRIAL DIVISION

P.O. BOX 1499
HOBBS, NM 88240
505-393-7751

P.O. BOX 572
BORGER, TX 79007
806-273-6531

P.O. BOX 755
CASPER, WY 82601
307-235-5906

RT. 4 BOX 100
BOBBY LANE
BEAUMONT, TX 77705
409-724-6535

WATER ANALYSIS

ALL RESULTS EXPRESSED IN PPM UNLESS OTHERWISE NOTED

CLIENT NAME: WARREN PETROLEUM COMPANY
FACILITY:
LOCATION: SOUTHEASTERN, N.M.

DATE: 01/30/85
SAMPLE DATE: 01/08/85
DATE ANALYZED: 01/30/85

SAMPLE IDENTIFICATION :	SAUNDERS PLANT WASTE WATER	VADA PLANT WASTE WATER	MONUMENT PLANT WASTE WATER
ZINC	NIL	0.08	0.05
LEAD	.04	NIL	NIL
CHROMIUM	0.3	0.02	0.1
BARIUM	.05	NIL	0.1
COBALT	NIL	NIL	NIL

NOTE: Sampling and analytical procedures used in these analyses conform with those outlined in Standard Methods for the Examination of Water and Wastewater (APHA) and/or Methods for Chemical Analysis of Water and Waste (EPA).

*** INDICATES THAT THIS TEST WAS NOT RUN

TEL. 512-884-0371 PO BOX 2552 7840

JORDAN LABORATORIES, INC.
CHEMISTS AND ENGINEERS
CORPUS CHRISTI, TEXAS
JUNE 27, 1985

WARREN PETROLEUM COMPANY
P.O. BOX 1589
TULSA, OKLAHOMA 74102

REPORT OF ANALYSIS

IDENTIFICATION: W.P.C. VADA
10:00 AM 6-6-85

	MG/L
PHENOLS	13
BENZENE	19.0
TOLUENE	12.0
ORTHOXYLENE AND PARAXYLENE	0.74
METAXYLENE	0.79
ALUMINUM	0.02
ARSENIC	0.006
BORON	1.8
CADMIUM	0.0006
MOLYBDENUM	0.01
NICKEL	0.05

LAB. NO. M23-3541

RESPECTFULLY SUBMITTED,

CARL F. CROWNOVER

SECTION VIII

SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

VADA PLANT

WARREN PETROLEUM COMPANY

DIVISION OF CHEVRON U.S.A. INC.

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

QUICK REFERENCE REPORTING/NOTIFICATION PROCEDURES

QUICK REFERENCE DOCUMENT

SPILL CONTAINMENT AND NOTIFICATION PROCEDURES

If a spill occurs, the flow should be stopped and help acquired, if necessary. Contact Plant Manager or alternates if he is not available. Contain the spill using procedures in this plan. Refer to reporting requirements after spill cleanup. These procedures directly follow.

Contacts

J. R. Boyd	(505) 396-3157
W. I. Mayfield	(505) 396-5566; 396-5561 or 396-2131
K. E. Buckley	(505) 396-5514
B. G. Schulz	(918) 560-4400
D. E. Todd	(918) 560-4052 or (918) 243-5279
L. T. Reed	(918) 560-4119 or (918) 663-3397

Directed Contacts

National Response Center	(800) 424-8802
Eighth Coast Guard District Duty Officer	(504) 589-6225
EPA Region VI	(214) 767-2720
Emergency Response (EPA Region VI)	(214) 767-2666
New Mexico Oil Conservation Division	
Santa Fe Office	(505) 827-5800
Hobbs District Office	(505) 393-6161
New Mexico Environmental Improvement Division	
Santa Fe Office	(505) 984-0200
Carlsbad District Office	(505) 887-3436 or (505) 885-9023
New Mexico State Corporation Commission	
Pipeline Division/Santa Fe	(505) 827-4497

Miscellaneous Contacts

Fire Department	(505) 398-5555 (Tatum); 911 (Lovington)
Ambulance	(505) 398-5555 (Tatum); 911 (Lovington)
Hospital	(505) 396-6611 (Lovington)
Sheriff (Lea County)	(505) 398-4444 (Tatum); 911 (Lovington)
State Police	(505) 911

Other Plant Personnel

K. W. Mapp	(505) 396-7475
K. E. Buckley	(505) 396-5514
S. D. Jones	(505) 396-2471
S. K. Scriviner	(505) 396-3033

Equipment/Disposal Services (Gandy Corporation - Tatum & Lovington) ..... (505)398-4960

VADA PLANT

SPILL NOTIFICATION PROCEDURES

Federal, state and local water pollution control agencies require that certain discharges be reported. Discharges exhibiting any of the characteristics described below must be reported to the appropriate government agencies as indicated.

OIL/HAZARDOUS SUBSTANCES

Reportable Spills

1. Any discharge of oil into or adjacent to navigable waters, or
2. Any release of a reportable quantity[1] of a hazardous substance to the environment (water, air, or land).

Report[3]

Immediate, by telephone.

Agencies

State of New Mexico Environmental Improvement Division: (Santa Fe) 505/984-0200, (Carlsbad) 505/887-3436, or 505/885-9023; and US Environmental Protection Agency-Emergency Response (Dallas Regional Office) 214/767-2666; and National Response Center 800/424-8802; and State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 or (Hobbs) 505/393-6161.

MAJOR BREAKS, SPILLS, OR LEAKS

Reportable Spills

1. Discharge of 25 or more barrels of crude oil or condensate or 100 barrels or more of salt water, none of which reaches a body of water, and/or,
2. Discharge of one or more barrels of crude oil or condensate or 25 barrels or more of salt water into a body of water, and/or
3. Endanger health or damage property.

Report[3]

As soon as possible by telephone. Written report within 10 days of incident to district office.

Agencies

State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 and (Hobbs) 505/393-6161.

MINOR BREAKS, SPILLS, OR LEAKS

Reportable Spills

Discharges between 5 to 25 barrels of crude oil or condensate or between 25 to 100 barrels of salt water, none of which reaches a body of water.

Report[3]

Written report within 10 days of incident to district office.

Agencies

State of New Mexico Oil Conservation Division-Hobbs District office: 505/393-6161

SPILL NOTIFICATION PROCEDURES - Continued

PIPELINE LEAK

Reportable Spills

1. Caused a death or caused a personal injury requiring hospitalization, and/or
2.[2] Required taking a segment of pipeline out of service, and/or
3.[2] Resulted in gas igniting, and/or
4. Caused an estimated property damage of $5,000 or more, or
5. Was significant although not part of 1. through 4., above.

Report[3]

Immediate by telephone. Written report within 10 days of incident.

Agencies

US Department of Transporation through the National Response Center 800/424-8802; and New Mexico State Corporation Commission (Santa Fe) 505/827-4497.

[1]Reportable quantities of hazardous substances are listed in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations), prepared by Gulf Oil Corporation - pages 40-117-1 through 40-117-4; Hazardous Wastes are listed in the Federal Register, Volume 45-No. 98, May 19, 1980.

[2]Notice is not required if 2. and 3. occurred solely as a result of, or in connection with, a planned or routine maintenance or construction.

[3]Contents of Telephone Report

Described in further detail in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations) - Prepared by Gulf Oil Corporation, Page 40-112-2 through 40-112-3.

a. Name, title, and telephone number of reporter.
b. Name of facility.
c. Name of owner or operator.
d. Location of facility.
e. Time and type of incident (e.g., fire, explosion, etc.)
f. Location of spill or discharge including name of waters involved.
g. Type and quantity of material spilled.
h. Other information that may be required.
i. Request the name of the person to whom you reported.

Additional information to be included in the written report:

a. Initial startup date of facility.
b. Maximum storage or handling capacity, daily average throughput.
c. Description of facility including process flows, plot plan, and topographic map.
d. Copy of SPCC Plan.
e. Cause of the spill(s).
f. Corrective action(s) taken.

SPILL NOTIFICATION PROCEDURES (Continued)

g. Preventive measure(s) taken.
h. Extent of any physical damage and/or personal injuries.

All reported information should be logged and documented for record keeping purposes.

Statutory Authority

New Mexico Statutes Annotated (NMSA) Chapter 70 Oil and Gas, Article 2, §§ 70-2-1 through 70-2-36, Oil and Gas Act.

NMSA Chapter 30 Criminal Offenses, Article 16, §§ 30-16-46 through 30-16-48.

NMSA Chapter 70 Oil and Gas, Article 7, §§ 70-7-1 through 70-7-21, Statutory Unitization Act.

NMSA Chapter 74 Environmental Improvement, Article 6, §§ 74-6-1 through 74-6-4, 74-6-6 through 74-6-13, Water Quality Act.

Regulations

New Mexico Oil Conservation Division (OCD) Rules and Regulations, Section B Miscellaneous Rules.

Activities Regulated

1. This Section applies to miscellaneous rules of the OCD. OCD Section B.

Activities Excluded from Regulation

None is specified.

Agencies

The OCD shall have, and is hereby given, jurisdiction and authority over all matters relating to the conservation of oil and gas and the prevention of waste of potash as a result of oil or gas operations in this state. NMSA § 70-2-6.

2. The Oil Conservation Commission (Commission) shall have concurrent jurisdiction and authority with the OCD to the extent necessary for the Commission to perform its duties as required by law. NMSA § 70-2-6.

Requirements

1. **Scope of rules and regulations.** OCD Rule 1.
   a. The following general rules of statewide application have been adopted by the OCD of the New Mexico Energy and Minerals Department to conserve the natural resources of the state of New Mexico, to prevent waste, to protect correlative rights of all owners of crude oil and natural gas, and to protect fresh waters. Special rules, regulations and orders have been and will be issued when required and shall prevail as against general rules, regulations and orders if in conflict therewith. However, whenever these general rules do not conflict with special rules heretofore or hereafter adopted, these general rules shall apply. OCD Rule 1(a).

   b. The OCD may grant exceptions to these rules after notice and hearing, when the granting of such exceptions will not result in waste but will protect correlative rights or prevent undue hardship. OCD Rule 1(b).

Notification of fire, breaks, leaks, spills, and blowouts. OCD Rule 116. The OCD shall be notified of any fire, break, leak, spill, or blowout occurring at any injection or disposal facility or at any oil or gas drilling, producing, transporting, or processing facility in the state of New Mexico by the person operating or controlling such facility.

"Facility," for the purpose of this rule, shall include any oil or gas well, any injection or disposal well, and any drilling or workover well; any pipe line through which crude oil, condensate, casinghead or natural gas, or injection or disposal fluid (gaseous or liquid) is gathered, piped, or transported (including field flow-lines and lead-lines but not including natural gas distribution systems); any receiving tank, holding tank, or storage tank, or receiving and storing receptacle into which crude oil, condensate, injection or disposal fluid, or casinghead or natural gas is produced, received, or stored; any injection or disposal pumping or compression station including related equipment; any processing or refining plant in which crude oil, condensate, or casinghead or natural gas is processed or refined; and any tank or drilling pit or slush pit associated with oil or gas well or injection or disposal well drilling operations or any tank, storage pit, or pond associated with oil or gas production or processing operations or with injection or disposal operations and containing hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, or other deleterious chemicals or harmful contaminants.

Notification of such fire, break, leak, spill, or blowout shall be in accordance with the provisions set forth below:

a. **Well blowouts.** Notification of well blowouts and/or fires shall be "immediate notification" described below. ("Well blowout" is defined as being loss of control over and subsequent eruption of any drilling or workover well, or the rupture of the casing, casinghead, or wellhead or any oil or gas well or injection or disposal well, whether active or inactive, accompanied by the sudden emission of fluids, gaseous or liquid, from the well.) OCD Rule 116-1.

b. **"Major" breaks, spills, or leaks.** Notification of breaks, spills, or leaks of 25 or more barrels of crude oil or condensate, or 100 bbl or more of salt water, none of which reaches a watercourse or enters a stream or lake; breaks, spills, or leaks in which one or more barrels of crude oil or condensate or 25 bbl or more of salt water does reach a watercourse or enters a steam or lake; and breaks, spills, or leaks of hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, gases, or other deleterious chemicals or harmful contaminants of any magnitude which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" described below. OCD Rule 116-2.

c. **"Minor" breaks, spills, or leaks.** Notification of breaks, spills, or leaks of 5 bbl or more but less than 25 bbl of crude oil or condensate, or 25 bbl or more but less than 100 bbl of salt water, none of which reaches a watercourse or enters a stream or lake, shall be "subsequent notification" described below. OCD Rule 116-3.

d. **Gas leaks and gas line breaks.** Notification of gas leaks from any source or of gas pipe line breaks in which natural or casinghead gas of any quantity has escaped or is escaping which may with reasonable probability endanger human health or result in substantial damage to property shall be "immediate notification" described below. Notification of gas pipe line breaks or leaks in which the loss is estimated to be 1,000 or more million of cubic feet (Mcf) of natural or casinghead gas but in which there is no danger to human health nor of substantial damage to property shall be "subsequent notification" described below. OCD Rule 116-4.

e. **Tank fires.** Notification of fires in tanks or other receptacles caused by lightning or any other cause, if the loss is, or it appears that the loss will be, 25 or more barrels of crude oil or condensate, or fires which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" as described below. If the loss is, or it appears that the loss will be at least 5 bbl but less than 25 bbl, notification shall be "subsequent notification" described below. OCD Rule 116-5.

f. **Drilling pits, slush pits, and storage pits and ponds.** Notification of breaks and spills from any drilling pit, slush pit, or storage pit or pond in which any hydrocarbon or hydrocarbon waste or residue, strong caustic or strong acid, or other deleterious chemical or harmful contaminant endangers human health or does substantial surface damage, or reaches a watercourse or enters a stream or lake in such quantity as may with reasonable probability endanger human health or result in substantial damage to such watercourse, stream, or lake, or the contents thereof, shall be "immediate notification" as described below. Notification of breaks or spills of such magnitude as to not endanger human health, cause substantial surface damage, or result in substantial damage to any watercourse, stream, or lake, or the contents thereof, shall be "subsequent notification" described below, provided however, no notification shall be required where there is no threat of any damage resulting from the break or spill. OCD Rule 116-6.

Immediate notification. "Immediate Notification" shall be as soon as possible after discovery and shall be either in person or by telephone to the district office of the OCD district in which the incident occurs, or if the incident occurs after normal business hours, to the District Supervisor, the Oil and Gas Inspector, or the Deputy Oil and Gas Inspector. A complete written report ("Subsequent Notification") of the incident shall also be submitted in duplicate to the appropriate district office of the OCD within 10 days after discovery of the incident.

Subsequent notification. "Subsequent Notification" shall be a complete written report of the incident and shall be submitted in duplicate to the district office of the OCD district in which the incident occurred within 10 days after discovery of the incident.

Content of notification. All reports of fires, breaks, leaks, spills, or blowouts, whether verbal or written, shall identify the location of the incident by quarter-quarter, section, township, and range, and by distance and direction from the nearest town or prominent landmark so that the exact site of the incident can be readily located on the ground. The report shall specify the nature and quantity of the loss and also the general conditions prevailing in the area, including precipitation, temperature, and soil conditions. The report shall also detail the measures that have been taken and are being taken to remedy the situation reported.

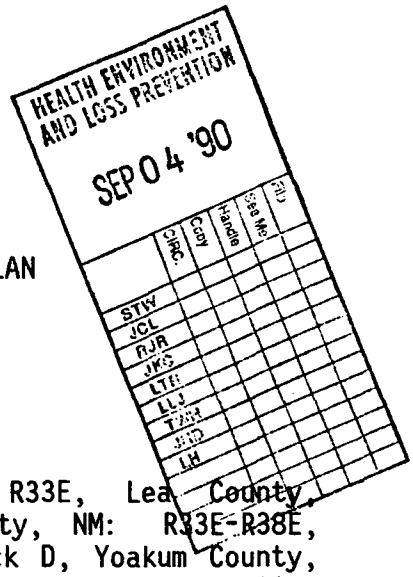
Watercourse. For the purpose of this rule, is defined as any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART I

GENERAL INFORMATION



PART I

GENERAL INFORMATION
SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

1. Facility name: Vada Plant

2. Facility type: Onshore Gas Plant

3. Facility location: SW/4 NW/4 Section 23 T10S R33E, Lea County, NM/Gathering System: R35E-R38E, T9S-T13S, Lea County, NM: R33E-R38E, T6S-T8S, Roosevelt County, NM: John H. Gibson, Block D, Yoakum County, Texas School Land A122; Randall County, Texas School Land A128 and A126, Sherman County, Texas School Land, Block Y and W Cochran County, Texas.

4. Owner or operator name and address: Warren Petroleum Company
P. O. Box 1689
Lovington, NM 88260

5. Name and title of oil spill prevention contact: J. R. Boyd
Plant Manager

6. Did facility experience a reportable oil spill event during the twelve months prior to 1-10-74 (effective date of 40 CFR, Part 112)? No
(If yes, complete Attachment 1.)

Management Approval
This SPCC plan will be implemented as herein described:

Signature: _____

Name: J. R. Boyd
Title: Plant Manager

Certification
I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Registered Professional Engineer: Scott T Wilson
(Print)
_____
(Signature)

(Seal)

Date: 9-7-90 Registration No. 9113 State: NM

PART I-GENERAL INFORMATION - Continued

7. Potential spills - prediction and control:

Source	Major Type of Failure	Quantity (Bbls)	Rate (Bbls/Hr)	Flow Direction	Secondary Containment
1) Product Tanks (5)	Rupture	3730	200	SE	NONE
2) Lube Oil Storage (2)	Leak	428	20	SE	NONE
3) Methanol Storage (3)	Leak	100	5	SE	NONE
4) Slop Tanks (2)	Leak	360	20	SE	DIKE
5) Heating Oil Storage (2)	Leak	24	2	SE	NONE
6) Engine Jacket Water Tanks (2)	Leak	420	20	SE	NONE
7) Refrigerant Propane	Rupture	190	100	SE	NONE
8) Amine Storage	Leak	214	20	SE	NONE
9) Antifreeze Storage	Leak	210	20	SE	NONE
10) Diesel Fuel	Leak	27	3	SE	NONE
11) Gasoline	Leak	48	5	SE	NONE
12) Propane Fuel	Rupture	66	6	SE	NONE

1) Contents of these vessels will vaporize when exposed to the ambient environment. Each tank has a capacity of 746 barrels. Spills would be contained by plant personnel until vaporized.

2) Each lube oil tank has a capacity of 214 barrels. Any spill would be contained by plant personnel.

3) Each tank has a capacity of approximately 35 barrels. Spills would be contained by plant personnel until vaporized, as methanol vaporizes when exposed to the ambient environment.

4) There are two tanks (150 bbls and 210 bbls) containing a total of 360 bbls. Both tanks are open to the atmosphere and contained in an earthen dike. Spills from these tanks would be hauled away by vacuum trucks.

5-12) Spills from the remaining vessels would all be contained by plant personnel.

The slop oil and glycol storage tanks are vertical welded steel tanks; the others are horizontal welded steel tanks.

Since the Vada Plant is located in an area where the probability of a spill reaching navigable water is negligible, any leak or spills could be contained by ditching and excavation.

8. Are containment, diversionary structures, or equipment to prevent oil from reaching navigable waters practicable? (If NO, complete Attachment 2.)
Yes.

9. Inspections and Records:

   a. Do the required inspections follow written procedures as contained in this plan? Not applicable.

   b. Are the written procedures and inspection records signed by the appropriate supervisor or inspector attached? Not applicable.

      Comment: Inspections at the plant do not require written procedures.

10. Personnel, training, and spill prevention procedures:

   a. Are personnel properly instructed in the following?

      1. Operation and maintenance of equipment to prevent oil discharges.
      Yes

      2. Applicable pollution control laws, rules, and regulations?
      Yes

      Describe procedures employed for instruction: All employees at this location have received written and verbal communication that no materials are to be released.

   b. Are scheduled prevention briefings for the operating personnel conducted frequently enough to assure adequate understanding of the SPCC plan? Yes

      Describe briefing program: The avoidance of process leaks or spills is discussed at safety meetings.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE A

DESIGN AND OPERATING INFORMATION

ONSHORE FACILITY (EXCLUDING PRODUCTION)

PART II, ALTERNATE A

DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) (Note: Flapper-type valves should not be used.) Not applicable.

   Vacuum truck will be used in the event of an oil spill to drain diked areas.

2. Drainage from undiked areas is controlled as follows: (Include description of ponds, lagoons, or catchment basins and methods of retaining and returning oil to facility.) Not applicable.

   The engine room drips drain into a sump which is pumped to slop tanks.

3. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

   Any contained rainwater is vacummed and hauled by Gandy Corporation.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features, and if needed, corrosion protection:

   Tanks meet or exceed Warren Petroleum engineering standards.

2. Describe secondary containment design, construction materials, and volume: An impervious earthen dike surrounds slop oil storage.

3. Describe tank inspection methods, procedures, and record keeping: Operator checks tanks for leaks on every shift; external inspection for rust, corrosion or structural damage.

4. Internal heating coil leakage is controlled by one or more of the following control factors:

   a. Monitoring the steam return or exhaust lines for oil. Describe monitoring procedure: Not applicable.

   b. Passing the steam return or exhaust lines through a settling tank, skimmer, or other separation system. Not applicable.

   c. Installing external heating systems. Not applicable.

5. Disposal facilities for plant effluents discharged into navigable waters are observed frequently for indication of possible upsets which may cause an oil spill event. Not applicable.

   Describe method and frequency of observations: The contents of the two self-contained slop tanks are hauled by truck and disposed in approved injection wells.

C. Facility Transfer Operations, Pumping and Inplant Process

1. Corrosion protection for buried pipelines:
   a. Are pipelines wrapped and coated to reduce corrosion? Yes
   b. Is cathodic protection provided for pipelines if determined necessary by electrolytic testing? Yes
   c. When a pipeline section is exposed, is it examined and corrective action taken as necessary? Yes

2. Are pipeline terminal connections capped or blank-flanged and marked if the pipeline is not in service or on standby service for extended periods? Yes

   Describe criteria for determining when to cap or blank-flange:

   Lines that can be opened to atmosphere are blinded or capped when out of service.

3. Are pipe supports designed to minimize abrasion and corrosion and allow for expansion and contraction? Yes

   Describe pipe support design:

   Piping is put on shoes with angle supports for expansion and contraction.

4. Describe procedures for regularly examining all aboveground valves and pipelines including flange joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces:

   Operator inspects plant piping daily.

5. Describe procedures for warning vehicles entering the facility to avoid damaging aboveground piping:

   All visitors must sign in. Overhead piping driveways are protected by a barrier piping.

D. Facility Tank Car and Tank Truck Loading/Unloading Rack
Does tank car and tank truck loading/unloading occur at the facility? If yes, complete 1 through 5 below. Yes.

1. Does loading/unloading procedures meet the minimum requirement and regulations of the Department of Transportation? Yes.

2. Does the unloading area have a quick drainage system? No.

PART II-ALTERNATE A - Continued

3. Will the containment system hold the maximum capacity of any single compartment of a tank truck loaded/unloaded in the plant? Not applicable.

   Describe containment system design, construction materials, and volume: Condensate vaporizes upon exposure to atmosphere.

4. Is an interlocked warning light, a physical barrier system, or warning signs provided in loading/unloading areas to prevent vehicular departure before disconnect of transfer lines? Yes.

   Describe methods, procedures, and/or equipment used to prevent premature vehicular departure: All drivers are instructed as to how to properly connect and disconnect to loading system. Trucks blocked when loading.

5. Are drains and outlets on tank trucks and tank cars checked for leakage before loading/unloading or departure? Yes.

E. Security

1. Are plants fenced that are handling, processing, or storing oil? Yes

2. Are entrance gates locked and/or guarded when the plant is unattended or not in production? Yes

3. Are any valves which permit direct outward flow of a tank's contents locked closed when in non-operating or standby status? No

4. Starter controls on all oil pumps in non-operating or standby status are:

   a. locked in the off position. No.
   b. located at site accessible only to authorized personnel. Yes.

5. Discussion of items 1 through 4 as appropriate:

   Valves and pumps are not locked out but are operated by Vada personnel only.

6. Discussion of lighting around the facility:

   Plant lighting is adequate to observe any visitor to the plant. It is also sufficient to observe any spill.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE B

DESIGN AND OPERATING INFORMATION

ONSHORE OIL PRODUCTION FACILITY

PART II, ALTERNATE B

DESIGN AND OPERATING INFORMATION
ONSHORE OIL PRODUCTION FACILITY

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) Not applicable.

2. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

3. Field drainage ditches, road ditches, and oil traps, sumps, or skimmers, if such exist, are inspected at regularly scheduled intervals for accumulation of oil. Any accumulated oil is hauled by vacuum truck on a regular basis.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features: Tanks meet or exceed Warren Petroleum engineering standards.

2. Describe secondary containment design, construction materials, and volume: Not applicable.

3. Describe tank inspection methods, procedures, and recordkeeping: Daily visual inspection by operators.

C. Facility Transfer Operations

1. Describe scheduled basis for examinations of aboveground valves and pipelines and salt water disposal facilities:

   All aboveground equipment is inspected daily. Leaks are reported and repaired.

2. Describe flowline maintenance program to prevent spills:

   Gas gathering system is monitored for leaks. Currently upgrading old steel lines with polyethylene pipe which has a high resistance to corrosion.

D. Oil Drilling and Workover Facilities

1. A blowout preventer (BOP) assembly and well control system is installed before drilling below any casing string and, as required, during workover operations. Not applicable.

2. The BOP assembly is capable of controlling any expected wellhead pressure. Not applicable.

3. Casing and BOP installations conform to state regulations. Not applicable.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART III

SPILL HISTORY

SPILL HISTORY

There have been no spills at the Vada Plant. It is very unlikely that a spill would occur which would leave the property thereby entering a navigable waterway. However, Form S/WPC-SPCC-1, an example of which follows, will be used to record information should a spill occur.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

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(INCIDENT)

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(INCIDENT)

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART IV

CONTINGENCY PLAN

(ATTACHMENT #2)

ATTACHMENT 2

OIL SPILL CONTINGENCY PLANS & WRITTEN COMMITMENT OF MANPOWER*

Secondary containment or diversionary structures are impracticable for this facility for the following reasons (attach additional pages, if necessary).

There is little likelihood that a spill could occur at this facility which would reach a waterway. Warren dedicates the commitment of personnel to inspect storage materials at least on a daily basis. Attention to any leaks will be immediate. Warren also dedicates the commitment of personnel to contain and remove any spilled material in an expedient manner.

Yes A strong oil spill contingency plan is intended.

Yes A written commitment of manpower is intended.

General

We are required, by law, to have at this location a "Prevention and Control Plan for Accidental Material Releases." This Plan includes procedures for the reporting, control, containment, and cleanup of any materials released. The term "Hazardous Material" includes any material that could adversely affect the well being of humans, animals, plant life, and/or environment due to its chemical composition, flammability or explosive characteristics. Of utmost importance is the notification and protection of the public. This plan includes the notification of the public when a release is in an area that would present a hazard.

Notification - Internal

1. Any employee detecting a release of hazardous material shall, if practical, take steps to control of contain the release.

2. Call the supervisor on duty giving the location and nature of the release.

3. The supervisor on duty will notify the Plant Manager, Response Team Employees, and if necessary, Equipment, Medical, and Law Enforcement Agencies.

Responsibility Chain

PLANT MANAGER

Employee on Duty Supervisor on Duty

Response Team Equipment Material Law Enforcement Medical

Phone numbers for employees and outside sources are available in the Reporting/Notification procedures of this Spill Plan.

*This SPCC plan contains an oil spill contingency plan and includes the commitment of manpower to implement the plan.

ATTACHMENT #2 - Continued

Action Plan

The release of various materials can occur at certain locations in the plant process area and in the field gathering system. Primarily, should a release occur, the Operator's function will be to report and control (by closing valves, etc.) the release. The following will be our plan of action for releases at various locations:

1. API Tanks

   a. Operator on duty will manually stop the pumping into the tanks.
   b. The liquid that is contained within the dike will then be removed with a vacuum truck.
   c. The ground surface will then be cleaned up and reclaimed within the dike area.

2. All Other Sources of Spills

   a. The operator will shutdown appropriate pumps, and close valves to tanks at which the spill occurred.
   b. Operator will notify supervisor on duty, who will then call-in additional personnel, if necessary.
   c. If a dike is necessary, our equipment on site can be used to contain the spill or additional equipment can be called in, if needed.
   d. After containment, the spill will be removed by vacuum truck and the spill area cleaned up and reclaimed.

3. Plant Spills Public Safety

   a. Due to the location of the plant, public safety should not normally be effected. However, the Plant Manager will determine if any spills could be detrimental to the public safety and take appropriate preventive action.
   b. The preventive action taken will depend on the amount, type, and location of the spill, and the Plant Manager will use his/her discretion of measures taken. Therefore, no predetermined action can be set.

4. Vada Gathering System

   Since our field gathering system is gas, our main concern regarding a field line rupture is public safety. The majority of the system, where a sudden release of natural gas were present, would not present a definite hazard to home dwellers and/or motorists. If leaks do occur near living areas and roads, personnel living in the area will be notified and roadblocks established to protect motorists. Leaks are normally reported by the public to the plant. Whoever takes calls will notify the supervisor on duty, who will in turn call out field personnel to repair the leak.

5. Summary

   Our basic plan of action upon releases of any materials will be the same:

a. Detect the release.
b. Control the release, if possible, by shutting off the source.
c. Notify company personnel.
d. Protection of company and non-company personnel.
e. Protection of equipment and the environment.
f. Cleanup and repair.

6. Prevention

Every effort will be made to prevent spills and/or line breaks. Every employee is expected to report any situation that appears to be a potential problem. Constant surveillance by all employees is necessary to prevent Materials Releases.

7. Public Safety

Public Safety was previously discussed for plant and field procedures. The purpose of this section is to create a procedure to notify the public that a hazard exists in their area and to instruct them to evacuate the area. Should a line rupture occur near a public road that would endanger motorists using that road, we must notify the County Sheriff's Department of the exact location. We will then block the road until Law Enforcement Officials arrive. Should a line rupture occur near a public or private dwelling that might endanger human life, our personnel will immediately notify the endangered persons, and notify the County Sherrif's Department for further instructions.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART V

ONSHORE FACILITY BULK STORAGE TANKS
DRAINAGE SYSTEM

(ATTACHMENT #3)

E

SPCC PLAN, ATTACHMENT #3
ONSHORE FACILITY BULK STORAGE TANKS
DRAINAGE SYSTEM

Inspection Procedure:

Diked areas are drained by use of a vacuum truck.

Record of drainage, bypassing, inspection, and oil removal from secondary containment:

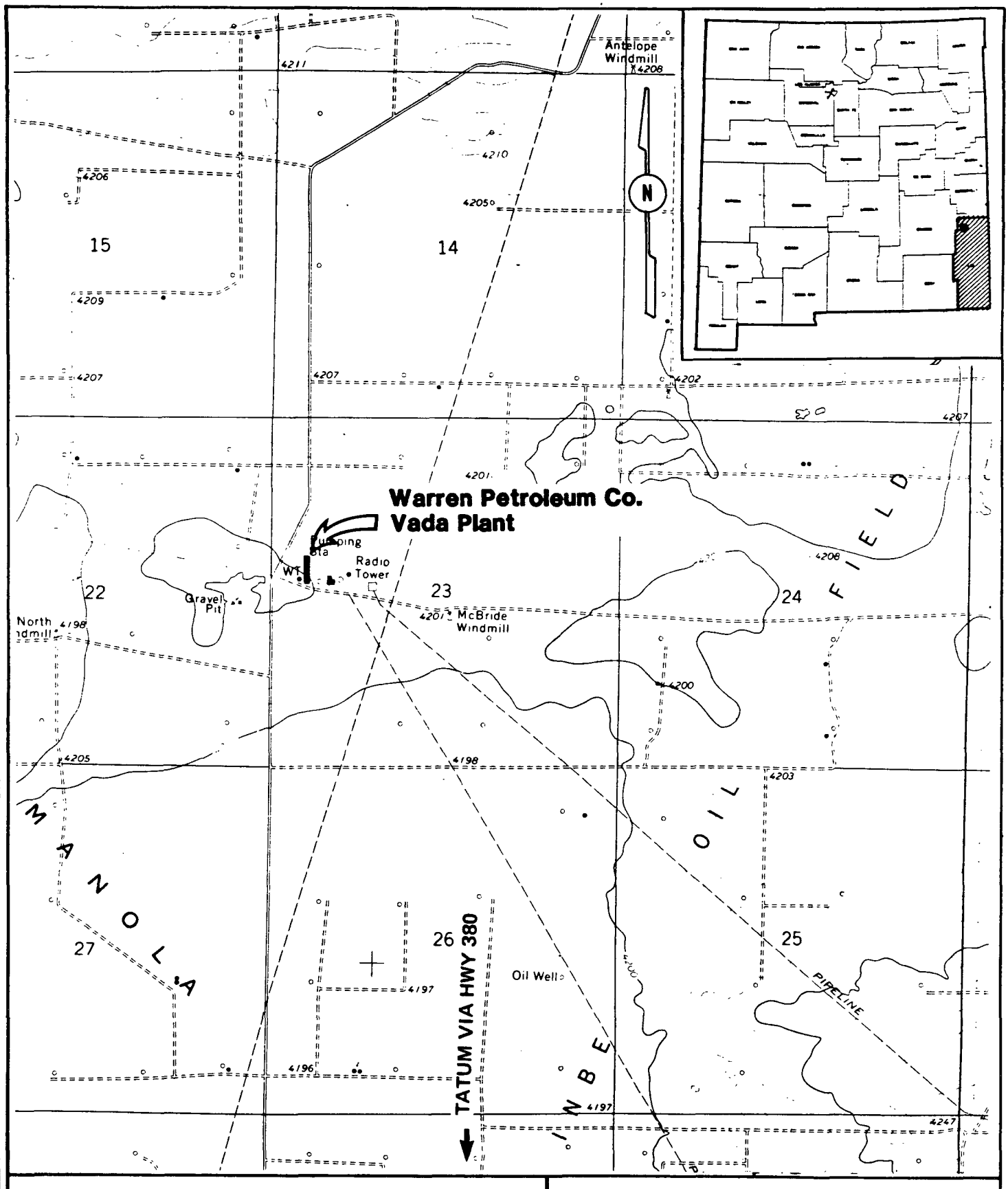
Date of Drainage	Date of Bypassing Open	Date of Bypassing Closed	Date of Inspection	Oil Removal	Supervisor's or Inspector's Signature

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART VI

LOCATION MAPS/PLANS



PLANT LOCATION
SEC. 23, T-10-S, R-33-E

APPROX. EL. 4225'
APPROX. LAT. 33°25'00" N
APPROX. LONG. 103°33'30" W

SCALE	DATE
1"= 2000'	7-27-82

Warren Petroleum Company

TULSA, OKLAHOMA

VADA
PLANT NO. 139
LEA CO., N.M.

LEGEND

VESSELS

30-1	INLET SCRUBBER
30-3	1ST. STAGE DISCHARGE SCRUBBER
30-4	2ND. STAGE DISCHARGE SCRUBBER
30-5	3RD. STAGE DISCHARGE SCRUBBER
30-9	LIQUID TREATER PRE-MIXER
30-10	LIQUID TREATER SETTLER
30-11	GAS CONTACTOR SCRUBBER
30-12	GAS CONTACTOR
30-13	LIQUID TREATER FLASH CAN
30-14	3RD. STAGE FILTER
30-15	GAS CONTACTOR SCRUBBER #2
30-16	GAS TO DEHYD SCRUBBER
30-17	FUEL SCRUBBER
30-18	RECOMPRESSOR DISCHARGE SCRUBBER
30-19	RECOMPRESSOR INTERSTAGE SCRUBBER
30-20	RECOMPRESSOR SUCTION SCRUBBER
30-21	REGEN. GAS SCRUBBER
30-22	ENGINE JACKET WATER SURGE
30-23	AIR VOLUME TANK
30-24	AIR VOLUME TANK
30-30	DEMETHANIZER
31-1	DEETHANIZER
31-2	FLASH CAN
31-5	LIQUID CONTACTOR
31-6	IRON SPONGE
V-1	STILL
V-2	CHARCOAL FILTER
V-3	SOCK FILTER
V-4	SOCK FILTER
V-5	CHARCOAL FILTER
V-6	SIDESTREAM CHARCOAL FILTER
V-9	REFRIGERATION SUCTION SCRUBBER
V-10	REFRIGERATION DISCHARGE SCRUBBER
V-11	STILL
V-12	AMINE FLASH CAN
V-13	ACID GAS SCRUBBER
V-33	AIR VOLUME TANK
V-101	AMINE FLASH CAN

TANKS

T-1	SOUR PRODUCT
T-2	SOUR PRODUCT
T-3	SWEET PRODUCT
T-4	SWEET PRODUCT
T-5	LUBE OIL
T-6	METHANOL
T-7	CONDENSATE
T-8	SWEET PRODUCT
T-9	REFRIGERANT PROPANE
T-10	LUBE OIL
T-11	AMINE
T-12	ANTIFREEZE
T-13	SLOP OIL
T-14	DIESEL FUEL
T-15	GASOLINE
T-16	PROPANE MOTOR FUEL
T-17	METHANOL
T-18	METHANOL
T-19	HOT OIL
T-20	HOT OIL
T-21	RAW WATER
T-22	SOFT WATER
T-23	ENGINE JACKET WATER
T-24	ENGINE JACKET WATER

COOLING FANS

CF-1	1ST. 2ND & 3RD STAGE GREEN GAS
F-2	COMPRESSOR #3 & #4
CF-3	COMPRESSOR #1 JACKET WATER
CF-4	COMPRESSOR #2 JACKET WATER
CF-5	GENERATOR JACKET WATER
CF-6	1ST. 2ND & 3RD STAGE GREEN GAS
CF-7A	COMPRESSOR #7 JACKET WATER
CF-7B	COMPRESSOR #8 JACKET WATER
CF-7C	COMPRESSOR #9 JACKET WATER
CF-7D	COMPRESSOR #10 JACKET WATER
CF-10	RECOMPRESSOR DISCHARGE/COMPRESSORS #11 & #12 JACKET WATER
CF-11	REFRIGERATION COMPRESSOR DISCHARGE
E-2	STILL OVERHEAD
E-3	LEAN AMINE
E-4	STILL OVERHEAD/LEAN AMINE
E-7	DEMETHANIZER REBOILER
E-105A	LEAN/RICH EXCHANGER
E-105B	LEAN/RICH EXCHANGER
18-1	WARM GAS/GAS EXCHANGER
18-2	COLD GAS/GAS EXCHANGER
18-3	ECONOMIZER
18-4	CHILLER
18-5	PRE-CHILLER

HEATERS

H-1	REBOILER
H-2	REBOILER
H-3	RECLAIMER
H-4	REBOILER
H-5	HOT OIL
H-6	HOT OIL
H-7	REGEN. GAS

MISCELLANEOUS

C-1 & C-2	REFRIGERATION COMPRESSORS
C-3 - C-10	GREEN GAS COMPRESSORS
C-11 & C-12	RECOMPRESSORS
EG-1 - EG-4	GENERATORS
D-1A & D-1B	DEHYDRATORS

E.0+00'-0" E.1+00'-0" E.2+00'-0" E.3+00'-0" E.4+00'-0" E.5+00'-0" E.6+00'-0" E.7+00'-0" E.8+00'-0" E.9+00'-0" E.10+00'-0" E.11+00'-0" E.12+00'-0"

N.8+00'-0" N.7+00'-0" N.6+00'-0" N.5+00'-0" N.4+00'-0" N.3+00'-0" N.2+00'-0" N.1+00'-0" 0+00'-0"

STORAGE · SHOP · COMPRESSOR BLDG. · RECOMPRESSOR BLDG. · CONTROL ROOM · CRYOGENIC SKID · PROCESS SKID · GENERATOR BLDG. · FLARE · HOT OIL PUMPS · SHOP · LAB · OFFICE · TRUCK LOADING · PIPELINE PUMPS · INVERTER BUILDING · WATER WELL · SODA ASH · STARTING AIR · BENCH MARK ELEV. 101'-0" OR EL. 100'-0"

GENERAL NOTES	GENERAL NOTES	DWG. NO.	REFERENCE DRAWINGS

NO.	REVISION	BY	DATE	CHK.	APPR.
1	REV. PER FIELD	LP	11/29		
2	ADDED LEGEND PER FIELD	LP	6/90		

AR OR NO

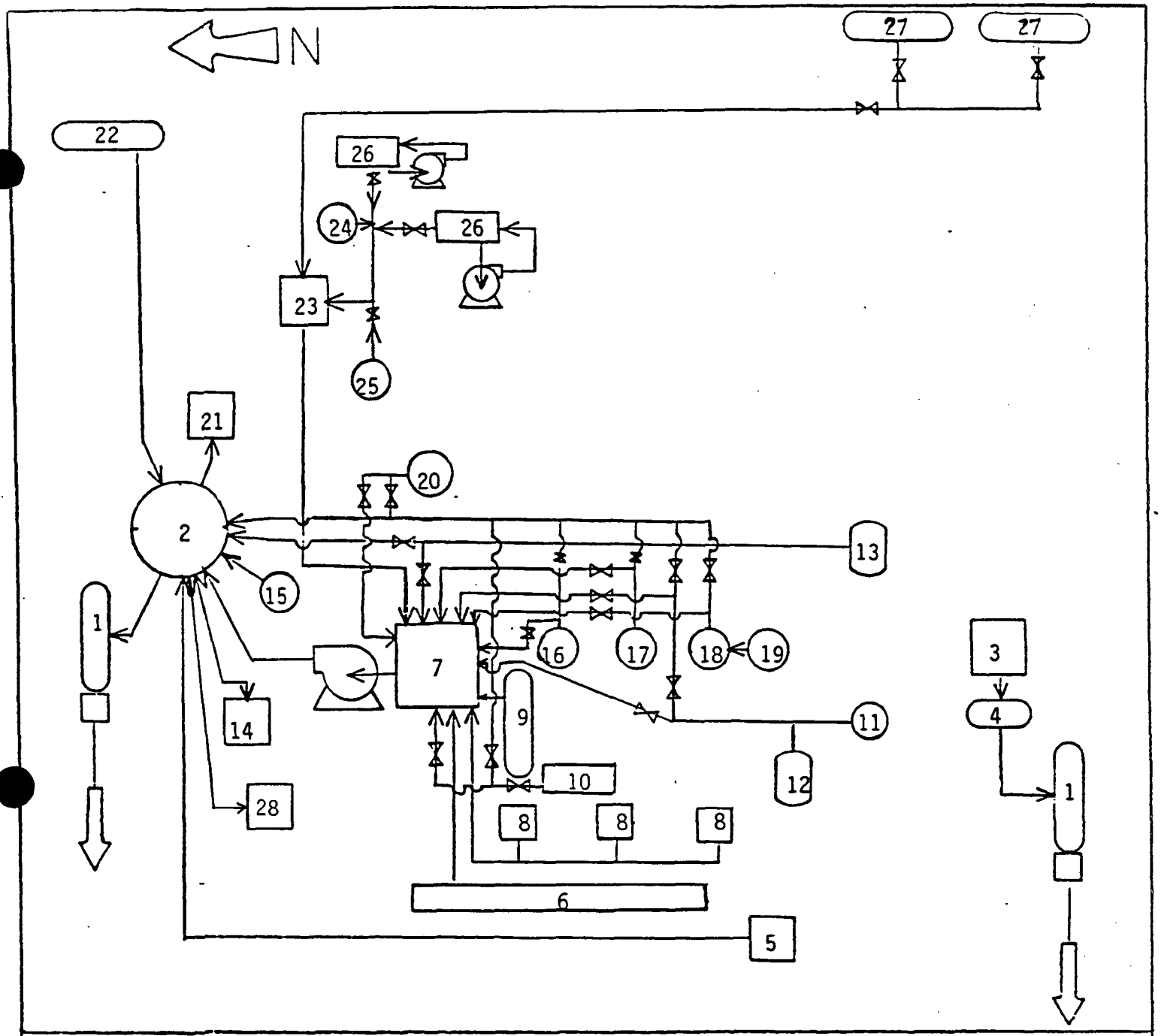
ISSUE: DATE | PRELIM. | CONST

WARREN PETROLEUM COMPANY
A DIVISION OF CHEVRON U.S.A. INC.
TULSA, OKLAHOMA

PLANT LAYOUT

PLT #139 VADA TATUM, N.M.

DRAWN RLK	DATE 12/86	SCALE 1"=40' 5-9-2
CHECKED	DATE	139-1000-2
APPR.	DATE	



1. Vacuum Trucks
2. Scrubber Oil Tanks
3. Generator Sump
4. Generator Scrubber Oil Tank
5. Zeolite Water Treater
6. Engine Room Sump
7. Main Plant Sump
8. Open Drains at Scrubbers
9. Inlet Gas Scrubber
10. Compressor Header Drains
11. Fuel Scrubber
12. 2nd Stage Scrubber
13. 3rd Stage Scrubber
14. Vapor Recovery Unit
15. Glycol Skid
16. Residue Inlet Scrubber
17. Recompressor Discharge Scrubber
18. 2nd Stage Recompressor Scrubber
19. Regen Gas Scrubber
20. Regen Gas Heater Scrubber
21. Earthen Dike-Overflow
22. Field Scrubber
23. Portable Tank Trailer
24. Heating Oil Drain
25. Propane Reclaimer
26. Amine Skids
27. Condensate Storage Tanks
28. Recompressor Bldg.

NO	REVISIONS	BY	DATE	CHK	APPR	ISSUED CONST DATE	ISSUED CONST BY

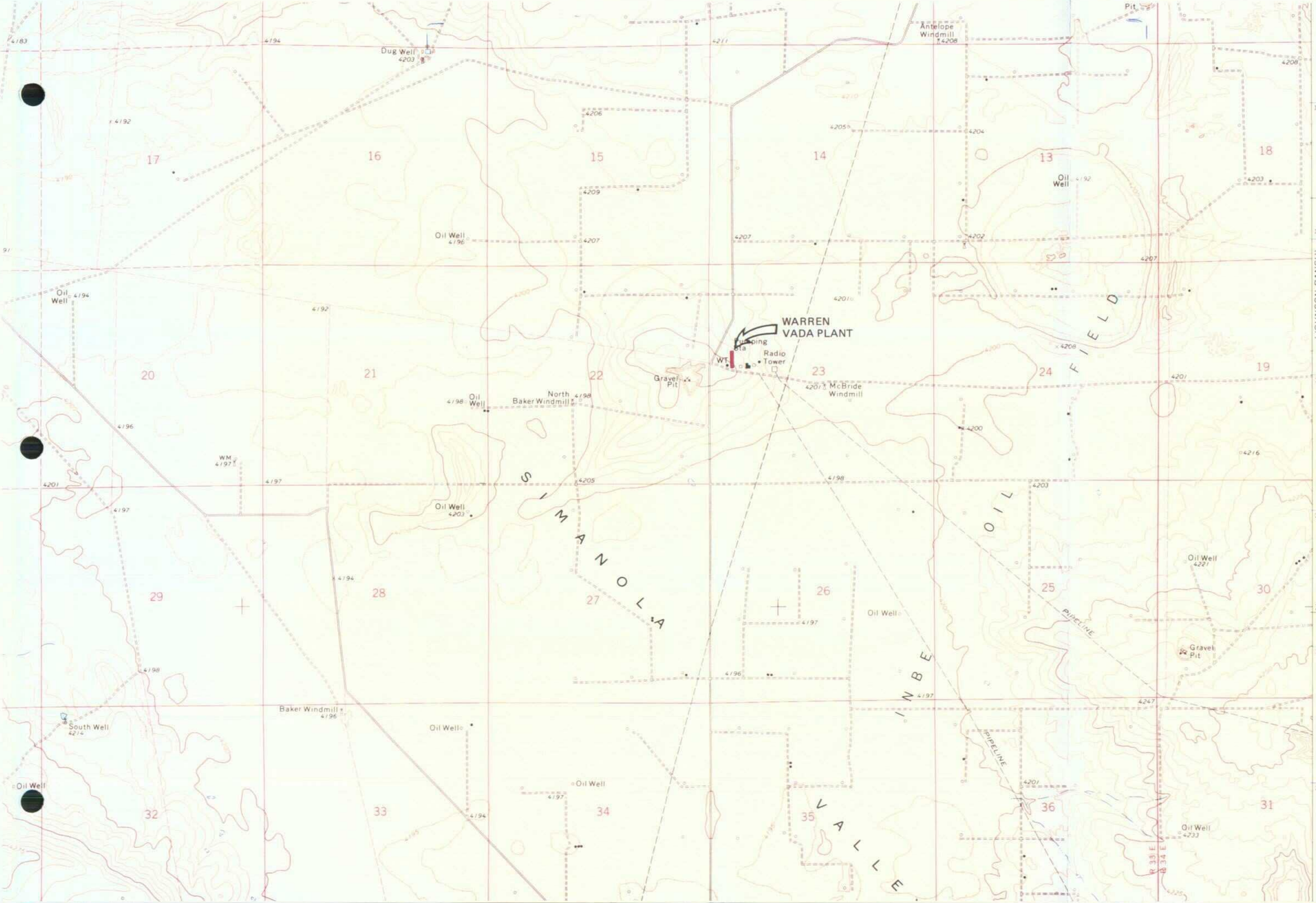
NO. OF SHEETS REQUIRED THIS — WC ARE NO

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM

VADA PLANT #139 — TATUM, N. M.

DRAWN BDM	DATE 1-4-85	SCALE
CHECKED	DATE	DRAWING NO
APPROVED	DATE	



WARREN
VADA PLANT
Pumping Sta
WT
Radio Tower
McBride Windmill
Gravel Pit
Antelope Windmill
Dug Well
North Baker Windmill
Baker Windmill
South Well
Oil Well
WM
Pit
SIMANOLA
VADA OIL FIELD
INBE VALLE
PIPELINE
(JOHNSON RANCH)
5350 IV NW
R 33 E
R 34 E
25′
17
16
15
14
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31

VADA PLANT

SPILL PREVENTION AND COUNTERMEASURE PLAN

PART VII

PART VII

SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

A daily visual inspection of the Vada Plant is made by Warren personnel. Any leaks are repaired as soon as possible. The underground tank is visually checked for leaks when it is emptied by vacuum truck.

The effluent contained within each of the two API tanks is trucked by the Gandy Corporation. The area around the two tanks is diked. There is an external gage glass on each tank. The tank contents are gaged daily and measured periodically with the tape strapping to determine the amount that is hauled away. The produced water and oil is sold to Gandy as needed.

Any water removed from diked area by vacuum truck is hauled from the plant by Oil Processing Company that, in turn, reclaims the oil and disposes of the remaining wastewater into an approved injection well. Pure rainwater is allowed to evaporate from the plant yard.

There has been no accumulation of sludge in the skimmers. Any particles are apparently held in suspension and removed by vacuum.

Plant inspections are made a minimum of three times per day; and, most of the time, the inspection is made once every four hours. The inspection consists of the visual observation of all plant operations (including the waste closest to the plant leading to the Rice injection well). Any leaks are found and repaired as soon as possible. Since this method has proved successful in that no spills have occurred from the storage tanks, other formal means for corrosion checks are not deemed necessary at this time. If we do suspect a problem, a thickness test is run on the tank.

SECTION IX

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

VADA GAS PROCESSING PLANT

This Waste Management Plan has been developed to meet Corporate and Governmental requirements concerning disposal of various operating materials at the end of its useful life.

At the present time, the Vada Plant does not generate any RCRA hazardous wastes. If or when it should be determined a hazardous waste exists, it will be disposed of according to RCRA standards with documentation and proper manifests in an approved hazardous waste disposal site. Formal contracts will be negotiated and disposal site inspections will be performed.

1. The following list shows the types, expected amounts, and source of wastes which are generated at the Vada Plant:

TYPE	EXPECTED AMOUNT	SOURCE
Filter Cartridges	759/year	Oil Filter, Dehydrator Dust Filters, Air Filters, Amine Filters
Process Wastewater	12,000 Bbls/yr.	Wash Water, Produced Water
Plant Trash	8 Tons/yr.	Office Trash, Wood, Carboard, Miscellaneous
Sump & Tank Bottoms	60 Bbls/yr.	Scrubber Oil Tanks, Plant Sumps
Steel Drums	10 year	Chemical & Oil Drums
Molecular Sieve	1.5 Tons/yr.	Gas Dehydrators
Iron Exchange Resin	50 Lb/yr.	Water Softeners
Selica Gel	100 Lb/yr.	Instrument Air Dehydrators
Scrap Metal	5 Tons/yr.	Various
Used Oil	1,500 Bbls/yr.	Engines
Spent Charcoal	84 Bushels/yr.	Amine Filter
Iron Sponge	240 Bbls/yr.	Iron Sponge

1a. If asbestos or PCB's are encountered, they will be tagged and when necessary disposed of according to approved methods.

2. For the listed wastes, operating procedures are followed to minimize the amounts generated; such as steel drums are exchanged with the vendor, molecular sieve is regenerated if practical, etc.

3. All wastes listed in No. 1 have been properly classified as hazardous or non-hazardous. If a waste cannot be positively identified as hazardous or non-hazardous, then the Warren Petroleum Enviornmental Affairs Department will be contacted to recommend an outside company tod o testing and analysis.

4. The necessary safety precautions for handling each waste listed in No. 1 above should be taken to avoid adverse health affects. The Safety Department and Environmental Department are contacted when pecific precautions are needed. Reference to the Material Safety Sheets (MSDS) is made concerning proper handling of all products.

5. Potential for waste recycling is considered when the use of wastes is feasible in alternative processes, such as re-injecting water into a producing formation for enhanced oil recovery.

6. Following is the proper disposal methods in use for each of the waste items listed in No. 1:

TYPE	DISPOSAL METHOD
Filters	Waste Control of New Mexico
Process Waste Water	Trucked to a permitted disposal well
Plant Trash	Waste Control of New Mexico
Sump & Tank Bottoms	Vacuum trucked to treating plant
Steel Drums	Rinsed, crushed and sold to a scrap dealer (those that are not returnable)
Molecular Sieve	Buried on Site
Ion Exchange Resin	Buried on site
Silica Gel	Buried on site
Scrap Metal	Sold to scrap dealer
Used Oil	Added to scrubber oil sales
Spent Charcoal	Buried on site
Iron Sponge	Buried on site